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WORLD MARITIME UNIVERSITY
Malmö, Sweden

FUTURE MARITIME EDUCATION AND TRAINING
IN INDONESIA

by
Dion Lebang
Indonesia

A dissertation submitted to the World
Maritime University in partial fulfilment of
the requirements for the award of the

Degree of Master of Science

in .

Maritime Education and Training (Nautical)

Year of Graduation

1991

I certify that all material in this dissertation which is not my own work has been identified and that no material is included for which a degree has been previously conferred upon me.

The contents of this dissertation reflect my personal views and are not necessarily endorsed by the University.

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Preface

Being a country with a huge population, one problem Indonesia has to overcome is a high unemployment rate. One way to approach this problem, as addressed in the preamble of the national constitution, is to educate people and develop human resources in order to assure them a better chance of earning a living.

The shipping industry is one of the sectors that should be taken in to account, and job opportunities at sea may be expanded by enhancing maritime training and education. To limit its scope, this paper will mainly discuss future maritime education and training for seafarers, namely for officers, and examine the prognoses for the future world demand of seafarers.

Today there are new demands stemming from changes in the industry, especially the new technological developments in shipping operations, the reduced crews on board, and the more automated navigation and communications systems. Also the stability of a ship can be calculated automatically. Education in the maritime field should be directed at these trends in order to operate and run ships safely, effectively and efficiently.

Therefore, in this paper, Chapter I, will mainly discuss the need to facilitate and give more priority to the seafaring careers.

Chapter II discusses the background of maritime trade and shipping activities in Indonesia in regard to population, geography, gross national product, exports/imports and the national fleet services and divisions. The development of

the world maritime trade and the world fleet is presented in facts and figures. The chapter also explores non-regional maritime trade and shipping activities with a special interest in Japan, Singapore, Hongkong, Taiwan, Korea and open flag registry ships. It then examines the future world demand for seafarers, particularly during the next decade and with special focus on the countries mentioned above. The last phase of this chapter deals with the opportunities and prospects in seafaring careers and the need for more encouragement of young people to go to sea.

Chapter III concerns the objectives of Indonesian Maritime Education and Training which are considered in terms of national objectives and maritime objectives. For many years now MET in Indonesia has been mainly directed in providing seafarers for national fleet users, and therefore this paper also discusses the possibility of broadening this objective to include the training of seafarers for overseas users.

Chapter IV deals with the current state of MET systems in Indonesia, and also in this chapter is a comparison of MET systems in selected maritime countries with a focus on the systems which are more likely to be commonly applied in the future.

Chapter V considers the question of the future of MET in Indonesia by looking at the development of the shipping industry and the implications for the MET systems.

Chapter VI presents the Conclusion and Recommendations

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I. INTRODUCTION

1 INTRODUCTION

A seafaring career is an important opportunity which for many years has not been facilitated and given enough priority in Indonesia. In the same region, the Philippines, with a smaller population than Indonesia, has a larger percentage of seafarers employed overseas. Although Indonesia has had maritime education and training since 1948, based on Dutch models, the objective has been merely to provide marine officers for the needs of the national fleet only.

Taking into account the future development of the shipping industry, which has grown steadily, and the fact that projections of the world demand for seafarers in the coming decade are substantially high, there is a need to develop the nation's potential human resources to meet the needs of the world. Although the domestic supply of seafarers, presently exceeds the national fleet demand, consideration must be given to the opportunities of overseas employment while they are widely available.

It is realized that the main obstacle to having this opportunity available is the lack of a skilled workforce, and therefore the best way to overcome this situation is by providing training and education.

Another problem that has arisen concerns the education and training of seafarers. In which direction should it go and what type of training should be required so that it may be suitable for the future demand?

In view of the trends in the shipping industry towards integrated and automated systems in every aspect of ship

I. INTRODUCTION

operations, it is foreseeable that most ships will have such systems in the future. It is therefore assumed that the training of seafarers will also go in the same direction.

With the assumption that integrated maritime training will eventually succeed, as in the various developed countries, it is not the suggestion that the study load be increased. In fact, due to technical developments the subject content of the old systems can be reduced.

Future maritime education and training will be looking to curriculum contents in which the most appropriate subjects, methods of teaching and teaching aids will be applied in order to reach the above objectives.

It is also felt that future maritime education and training must not be merely oriented to ships at sea but also to the maritime industry as the whole.

Therefore, in this paper the term integrated systems refers not only to ship operations, but also to the supporting maritime industry.

Although it is not discussed in this paper, the financing of education and training for seafarers for overseas employment, which might create problems as to who should pay what, could be provided on a cost-sharing basis. The government share of the budget might be predominant, with other contributions to be made by the shipping industry according to special arrangements.

II BACKGROUND

2.1 MARITIME TRADE AND SHIPPING ACTIVITIES IN INDONESIA, PACIFIC AND INDIAN OCEAN REGION.

2.1.1 Maritime trade and shipping activities in Indonesia:

Geographically Indonesia is an archipelagic state, forming a bridge between Asia and Australia and on the boundary of the Indian and Pacific ocean .The total land area is 1,903 ,650 sq km, which represents about one fifth of the total land area of Europe, or one quarter of Australia. However the total area (land and sea) is over 8,000,000 sq km, as large as Australia. The whole territory extends 4,800 km from east to west and 2,000 km from north to south, and covers 17 degrees of latitude (6 N to 11 S) and 48 degrees of longi-tude (95 E to 144 E). There are at least 3,000 inhabited islands among a total of about 14,000, varying enormously in size. However the five largest (Irian, Java, Kalimantan, Sulawesi, and Sumatra) account for about 92 % of the land area. The smaller islands (Nusatenggara and Maluku) occupy most of the rest.

The population of the country, according to 1990 figures, is 187.6 million, of which 72.2 million constitute the workforce. The main fields of labour are agriculture and fishing, which account for 56.1 % of the total workforce. The other main labour sectors are commerce and services, which employ 29.8% . The remaining 8% is in manufacturing and the lowest 5.6% goes to the government and public authorities.

The Gross National Product in 1990 was 104.7 US\$b, which means that the annual income per capita is US\$ 560. The major industrial activities are textiles (3.50 billion meters), steel 1.08 (million tons), vehicle assembly

(166,000 units), cement (13.35 million tonnes), cigarettes(krétek) and plywood.

The major agricultural production includes rice (41.8 million tonnes), copra and coconuts (2.11 million tonnes), rubber, palm oil, cassava, cane sugar and coffee.

Oil and natural gas production is about 1.5 million barrels per day; gas, 4.9 trillion cu ft per day.

The mining sector consists of coal (2.6 million tons) tin (29 thousand tons), nickle ore (1.88 million tonnes) and bauxite (514 thousand tons)

The major imports are capital equipment, oil and oil products, chemical products, base metals, food and beverages and tobacco, with a total value of 22 US\$b.

The major exports are oil and oil products, LNG, timber, rubber, textiles, and garments and handicrafts, with a value of 23 billion US\$ in 1990.

Maritime trade and shipping activities are playing an important role throughout the country. Domestic trade between the islands is mainly carried out by sea transport. The national shipping fleet is mostly engaged in domestic services. However, the shipping activity is not restricted to domestic services only, but also serves trade to other countries. The overseas trade is carried out by the national group of shipping companies dedicated to these activities together with foreign shipping companies.

The total cargo throughput for inter-island services in 1990 amounted to about 4.5 million tons.

The leading role in national maritime trade activities is performed by INSA (Indonesian National Shipowner Association), which consists of four main divisions of

services and activities with a total number of 1722 ships above 100 GRT. 1)

The services and activities in which these divisions are involved as described below :

The overseas fleet services division comprises six companies and consists of 89 ship units with a total tonnage of 800.000 dwt and capacity of 12.000 TEU.

In the domestic fleet services division, there are 49 shipping companies engaged consisting of 713 ship units with a total tonnage of 1.8 million dwt.

Local trade services are still playing a major part in the maritime trade activities, although they use traditional sailing/motor ships. This fleet consists of 920 ships with a total tonnage of 84.000 GRT.

The special carrier division consists of the ships engaged in the transportation of mineral or industrial bulk products such as crude oil/petroleum, tin ore, and timber logs. Offshore supply and other dry bulk carriers are operated.

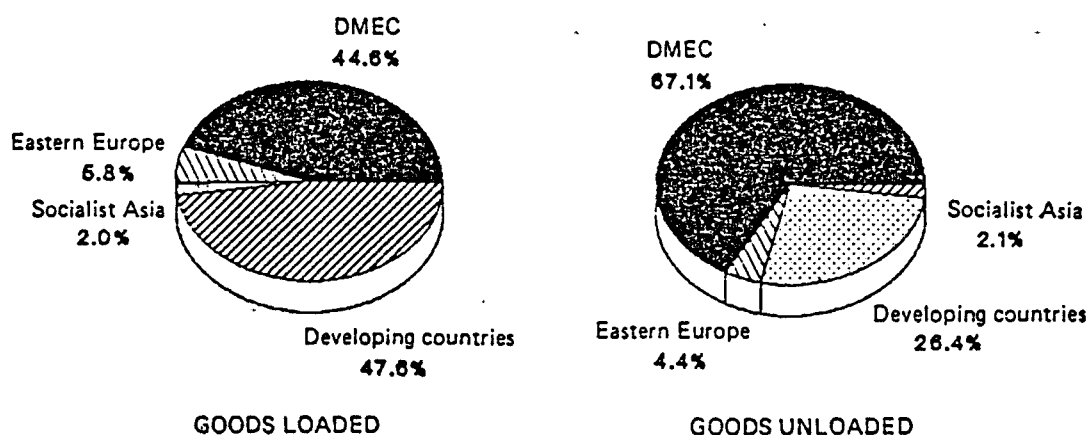
With the steady growth of the country's economy in the last five years and the government's policy to boost national exports and promote national shipping activities, it is expected that Indonesian maritime transport activities will increase.

For the world international trade, it is estimated that 95.0 % of all goods shipped in international trade move by water transport. 2)

The major international trade routes are transatlantic, transpacific, Europe-Asia and the interregional Asian trade.

The world maritime trade has increased from 3,735 million tons in 1988 to 3,940 million in 1989, which is a rise of about 5.2%. The most remarkable increase was in tanker cargoes (6.9%), while dry cargoes were up only 4.4%. The distribution of world maritime trade is given in Table 1.

WORLD SEABORNE TRADE BY COUNTRY GROUPS,
PERCENTAGE DISTRIBUTION OF TONNAGE 1989



Source: UNCTAD data bank.

The developed market economy countries generated 44.6 % of all cargoes loaded and 67.1% of all cargoes unloaded in that year. The developing countries, Socialist Asia and Eastern Europe generated the complementary figures.

that year. The developing countries, Socialist Asia and Eastern Europe generated the complementary figures. The total world fleet in 1989 was 78,336 ships of 100 GRT or more. 3)

The combined totals of developed market economy and open registry countries are dominant: they account for 67.5% of the world tonnage. However the developing countries increased their total deadweight from 131.2 million in 1988 to 135.0 million in 1989 (an increased of 2.9%) and accounted for 21.1% of the world tonnage as a group.

2.1.3 Maritime trade and shipping activities in the Pacific and Indian ocean region.

There are three major sectors of maritime trade and shipping activities which are of special interest for Indonesia: the Transpacific, Euro-Asia and Interregional Asian. According to data provided by the UNCTAD " Review of Maritime Transport 1989 ", the three major sectors of trading accounted for almost one fourth of the 1988 world merchandise trade. For the Pacific and Indian Ocean Region, this amounted to almost 1224.6 US\$b compared to 2,882.3 US\$b of the total world trade. The main features of seaborne trade in this region are crude oil, petroleum products and dry cargoes.

The most important maritime countries in the region which have to be considered are Japan, China, Hongkong, Taiwan, Singapore, India and South Korea.

Singapore is geographically situated in a strategic position at the crossroads of world maritime trade. It has now the biggest container handling port in the world with a total of 5.3 million TEU in 1990 . In that year the

total number of ships calling was about 45.000 vessels with a total grt 311.000.000.

Although Singapore has virtually no natural resources, due to its strategic position it has now become one of the busiest ports in the world whose main revenues stem from the transshipment of cargo .

Today Singapore has become one of a main shipping centers in the world, from which many of the world's shipping companies run their offices and fleet management operations in the region. In terms of ships owned or managed under the Singaporean Flag, this amounted to 774 ship units with a total tonnage of 12,964,590 tons.

Hongkong is another main shipping center in the region and it includes one of the largest container ports in the world. Hongkong seaborne trade activities amounted to 97,0 US\$b in 1987, which was 2% of the total world seaborne trade. Shipping Statistics Yearbook 1989 shows that the colonial territory also owned 10 % of the world tonnage (about 63.1 million dwt) under various flags of registry. Although in 1997 the territory will be handed back to China ,the shipping activities and maritime trade still are a main core business in the area .

Japan, for many years, has had the third largest merchant fleet in the world,with a total tonnage of 40,8 million dwt, or 15% of the world tonnage. In recent years there has been a substantial reduction in the Japanese fleet. On the other hand, they are recorded as a country where 63% of the fleet is under 10 years old. In its seaborne trade activities, Japan accounted for 382.3 US \$b in 1987 or 7.5% of the total seaborne trade.

In terms of economic development, Japan consolidated its

South Korea has developed tremendously in the last decade and it has recently become a giant in the shipping industry . The South Korean fleet of 12.5 million dwt comprises 2,110 ships.

In its seaborne trade activities , South Korea accounted for US \$ b. 112.5 in 1989.

China and India also play a vital role in maritime trade and shipping activities in the region, where China owns a total fleet of 1,907 ships of 13,513,578 dwt, and India owns a total fleet of 834 ships of 6,315.135 dwt.

Taiwan, under its national registry, owns a total fleet of 660 ships of 8,714,202 dwt. However, it also has a fleet under open flag registers.

Panama, Liberia and Norway ,under open flag registries, hold a total fleet of 7,273 ships with a total tonnage of about 200 millions dwt, or almost one-fifth of the world tonnage.

Table 2).

MERCHANT FLEET OF SELECTED COUNTRIES

FLAG	STEAMSHIPS		MOTORSHIPS		TOTAL STEAMSHIPS AND MOTORSHIPS		TOTAL TONNES DEADWEIGHT
	NO.	GROSS TONN.	NO.	GROSS TONN.	NO.	GROSS TONN.	
INDONESIA	26	26,575	1,696	2,808,485	1722	2,835,060	2,910,123
HONGKONG	2	288,113	373	6,276,874	375	6,564,987	11,176,839
JAPAN	22	2,247,346	9,978	24,838,597	10000	27,077,943	40,828,199
KOREA	8	499,579	2,182	7,283,496	2110	7,783,075	12,461,986
LIBERIA	136	14,316,363	1,552	40,383,201	1688	54,699,564	99,225,770
NORWAY (NIS)	26	3,586,419	831	17,858,697	837	21,445,116	39,206,815
PANAMA	56	2,972,624	4,692	36,325,499	4748	39,298,123	62,183,949
SINGAPORE	1	134	773	7,927,732	774	7,927,866	12,964,510
TAIWAN	1	1,459	659	5,764,824	660	5,766,283	8,714,202

2.2 The future world demand for seafarers

Based on the 1990 Warwick University research studies, it is estimated that there will be a huge shortage of seafarers in the year 2000. The supply and demand projection is based on identified key issues such as:

- I. Changes in the number and type of vessels;
- II Changes in manning requirement;
- III Wastage rates of qualified seafarers; and
- IV Numbers of new entrants or cadets qualifying each year.

An increase of 33% in the number of vessels is predicted over the next ten years. An UNCTAD report on forecasts of the world fleet by principal type of carrier shows an increase of approximately 30% from 650 million dwt in 1990 to 830 million in the year 2000. Dry bulk ships are predicted to show a substantial increase in tonnage capacity.

The second factor affecting demand is change in manning requirements. In shipping as in many industries, technological innovations tend to reduce labour costs and improve productivity. However, other factors have to be taken in to account; in particular, changes in the structure of the world fleet by type, size, and age, will influence manning needs. In addition, pressures from the environmental lobby and demands for improved safety may result in increased manning requirements.

The third crucial assumption concerns the loss of manpower from the industry due to wastage. The predicted wastage over the period 1990 - 2000 is 10% or about 27,000 personnel annually and is assumed valid for both officers and ratings.

and ratings.

The final factor affecting supply concerns the rate of newly qualified seafarers. On the average there is only one officer trainee for every twenty-five officers on board. The evidence suggests that current training levels are likely to produce some ten to twelve thousand new officers each year for the next three years at least.

Table 3)

**FORECAST OF SUPPLY AND DEMAND FOR SEAFARERS
BY FLAG
IN THE YEAR 2000**

FLAG	SUPPLY 1990 STOCK LESS WASTAGE		FORECAST DEMAND		DIFFERENCE (SUPPLY-DEMAND)	
	OFFICERS	RATINGS	OFFICERS	RATINGS	OFFICERS	RATINGS
INDONESIA	4966	13553	11689	20451	- 6644	- 6897
HONGKONG	729	1445	4404	5266	- 3675	- 3821
JAPAN	10511	12998	37305	40028	-26794	-27030
KOREA	6012	10436	9428	10472	- 3416	- 36
LIBERIA	15	179	28834	32071	-28818	-31892
NORWAY (NIS)			11922	13397		
PANAMA	110	894	55740	60562	-55631	-59668
SINGAPORE	288	1035	8036	8797	- 7748	- 7762
ALL FLAGS	138000	300000	535000	660000	- 397000	- 361000

SOURCE : COMPILED FROM ISF/BIMCO REPORT : THE WORLD WIDE DEMAND FOR AND SUPPLY OF SEAFARERS

The studies show that there will be an increased demand for seafarers, at least up to the year 2000, of about 400,000 officers or about 20% of the existing demand. The requirements for ratings will also go up by about 50,000 over the existing demand.

In the absence of new entrants or re-entrants over the next decade, assuming a natural wastage of 10% per year, and in conjunction with the projected growth in demand,

These figures suggest that very substantial recruitment and training efforts will be required over this decade if the commercial fleet is to be properly manned in the coming decade. At an average about 35 thousand newly qualified entrants or re-entrants will be required each year.

The report implies that the current recruitment and training levels are unlikely to be adequate and that MET will have to expand the production of qualified trainees significantly.

Whatever assumptions are adopted, it seems unlikely that the existing labour shortage problems are going to be resolved over the medium or long term. This will lead to a significant increase in the numbers of officers, in particular, that will be needed.

2.3 Opportunities and prospects in seafaring careers.

2.3.1. The attraction of university studies.

Indonesia has been a maritime country for years, which is illustrated by ancient stories about people from the islands sailing over to Madagascar in wooden junks. Unfortunately, today, not so many people, especially young ones, are interested in going to sea. The simple reasons are that the opportunity is not available enough and that there is a lack of skills and knowledge about ships and their environment.

Although each year in Indonesia about 600.000 graduates from high school participate in the entrance examinations for universities, the capacity of the universities is not more than 60.000 seats for new entrants, and therefore

only 10% of the applicants are admitted.

The attraction of the state universities is the nature of the studies offered .All state universities are accredited and the important thing is that the tuition fee is low because they are funded by the state. The students only pay a small part of it which is called an "education development fee".

Another option for university study is to go to a private university but this is only for the people who can afford higher fees.

A university degree,as in most countries, is regarded as prestigious for social status and in most cases it guarantees a good salary.

In the government services, a diploma from an accredited university is still considered the most essential qualification for a higher job.

2.3.2 The intake of merchant marine academies.

In 1989 only 5000 out of 600,000 high school graduates were interested in joining maritime academies. From these figures it is clear that many students prefer to attend a university rather than go to a vocational institute like a merchant marine academy.

The reasons for this preference are:

.1 Vocational institutes like a merchant marine academy are still,in the author's opinion, not well known throughout the country. There is the typical case where the students of a maritime academy come from the same region, while other regions do not provide any students at

all. An attempt has been made to distribute information about the maritime institutions nationwide by sending out brochures about the academies .

.2 School fees, boarding house costs, and food and daily subsistence expenses are, compared with the universities, relatively high. In some countries like Malaysia, Singapore and most European countries, lodging, school fees etc are borne by the government or by the shipping companies.

.3 The seafarers life is unknown in terms of job security and future opportunities.

.4 The world shipping recession in the eighties, although temporary, has given a job at sea a low rating.

.5 The government policy of scrapping old ships over 25 years old has had the negative effect that many seamen have lost their jobs.

2.3.3 Assessment of seafaring function.

It is commonly known that working on board ships can offer more substantial incomes compared with working ashore .A comparison shows that the seafarer earns 1/3 more than a shore-based employee assuming equal job qualifications.

As for social status, middle class society thinks that a job at sea is low in terms of status. They are not familiar with working at sea or with the functions of captains, mates or engineers. For people who are familiar with the sea, seafarers are highly respected,

2.3.4 Seafaring under foreign flags

For many years Singapore has been the main user of Indonesian crews and officers due to crew shortages and the number of Singaporeans who are not really interested in a sea career. We should take into account that the island republic has a relatively low population and that also a job ashore is more attractive than going to sea. Current studies show, that the total crew shortage in Singapore is 11,000, and it has been forecasted that in the year 2000 the shortages will increase to approximately 15,000. Until now Singaporean ships have been manned mostly by natives from neighbouring countries such as, Indonesia, the Philipines, Burma, Bangladesh ,India etc.

Taiwan and Japan are also big users of foreign crews at the moment. Shortages of about 1,884 ratings and 1871 officers are predicted in the year 2000 in Taiwan. For Japan shortages of about 25,000 officers and the same figures for ratings are also predicted .

There are some other factors which should be considered as the number of the open flag carriers grows.

For Panamian flag ships shortages are estimated of about 100,000 for both officers and ratings in the year 2000. For Liberian ships, the total shortage of officers and ratings will be about 60,000. And Norwegian International registry ships will have shortages of about 24,000 crew in the next decade. Therefore the opportunities to employ foreign crews are larger than ever before.

The decline of western crews also brings more opportunities for overseas seafarers in manning their ships.

The other important factor which has to be taken into account is the economic expansion of the Pacific Basin and its central function in world maritime trade in the future. Unless any drastic changes occur in the future, by war or other disasters, the prospects for seafarers are bright provided that they are sufficiently qualified for their job.

Today is the time for national policy makers to act by recognizing Maritime Training and Education as a main branch of human resources development. As big opportunities lie ahead for seagoing careers, training and education in this field must be updated and further developed. And the fact that this is the most significant moment to look forward and take advantage of the opportunities in ship manning requirements in the future.

References Chapter II:

- 1) Loyds Statistical tables 1990, Merchant Fleet of the World, Table 1.
- 2) White Lawrence, "Review of Maritime Trade ", Unctad, 1989
- 3) Loyds Statistical tables 1990, Merchant Fleet of the World, Table 1.

III. THE OBJECTIVES OF MARITIME EDUCATION AND TRAINING IN INDONESIA

3.1 National objectives.

The national objectives of education and training in a broad sense are stated in the national constitution (UUD 1945 Chapter 29) and in the preamble to this, which guarantees the development of national human resources by providing to every individual the right of education.

The government as the executive institution provides all possible means to establish, facilitate, and develop all kinds of necessary education in order to achieve these objectives.

Human resources development is one of the highest priorities which are laid down in every five-year term of the national development program.

The human resources development plan is always aimed at present and future requirements, through the development of educational and training programs.

3.2 National MET objectives.

The objective of national maritime education is to provide the highest quality of maritime skills and realize a comprehensive strategy for the development of human resources to meet all levels of international maritime standards, which will serve the economy and security interests of the nation.

At present, the maritime sector training program aims to improve maritime education and training in the following ways :

following ways :

- Provision of necessary hardware for maritime academies in accordance with IMO recommended list of equipment for maritime training institutions
- Technical assistance to study / review the existing education and training system

The maritime training objectives are related to the national maritime policy, which is to provide safe, reliable and efficient transportation and communication throughout the country.

The training of sea personnel is mostly dedicated to the domestic needs of the national shipping lines engaged in foreign trade or inter-island services, in which crew shortages of about 12,000 personnel are predicted for the year 2000 .

Another objective of Maritime Training and Education in the country is to train marine officers to fill posts in the Maritime Administration and, although on a very limited basis, to serve in shorebased industries such as power plants, in offshore industries, in military services , etc.

However, national maritime policy is not merely influenced by domestic interests but also by international maritime aspects. This is realized through the implementation of international maritime conventions regarding the standard of training and certification of watchkeeping for seafarers (STCW-1978 convention).

Although the training system serves well for domestic

needs, there are also exciting opportunities which arise from the demand for seafarers in the international market.

These opportunities must be fully exploited in order to create maritime job opportunities.

Therefore there must be extensive planning to train seafarers intended for international users. To be truly international the maritime education system has to be adapted to the international, developments and requirements. By implementing the International Convention STCW-1978 regarding the standard of training, only some of these requirements have been fulfilled.

Today, however, the national maritime education system is based on the following regulations which stem from more than 50 years ago:

- a. "SchepenOrdonantie and Schepen Verordening 1935" regarding manning requirements of ships.
- b. "Diploma Reglement 1939" regarding examination and certification which sets limitations of certificates for ships of certain tonnages.

The importance of raising the national MET for seagoing personnel to an international level is related to :

- 1. Broadening job opportunities.
- 2. Increasing standards of living.
- 3. Serving national economy and security interests.

Consequently the need for long term planning of

maritime education and training is an urgent matter.

In order to meet the future requirements, the national Maritime Education and Training system must be considerably modified. In the present system there are a lot of things that need to be improved, such as:

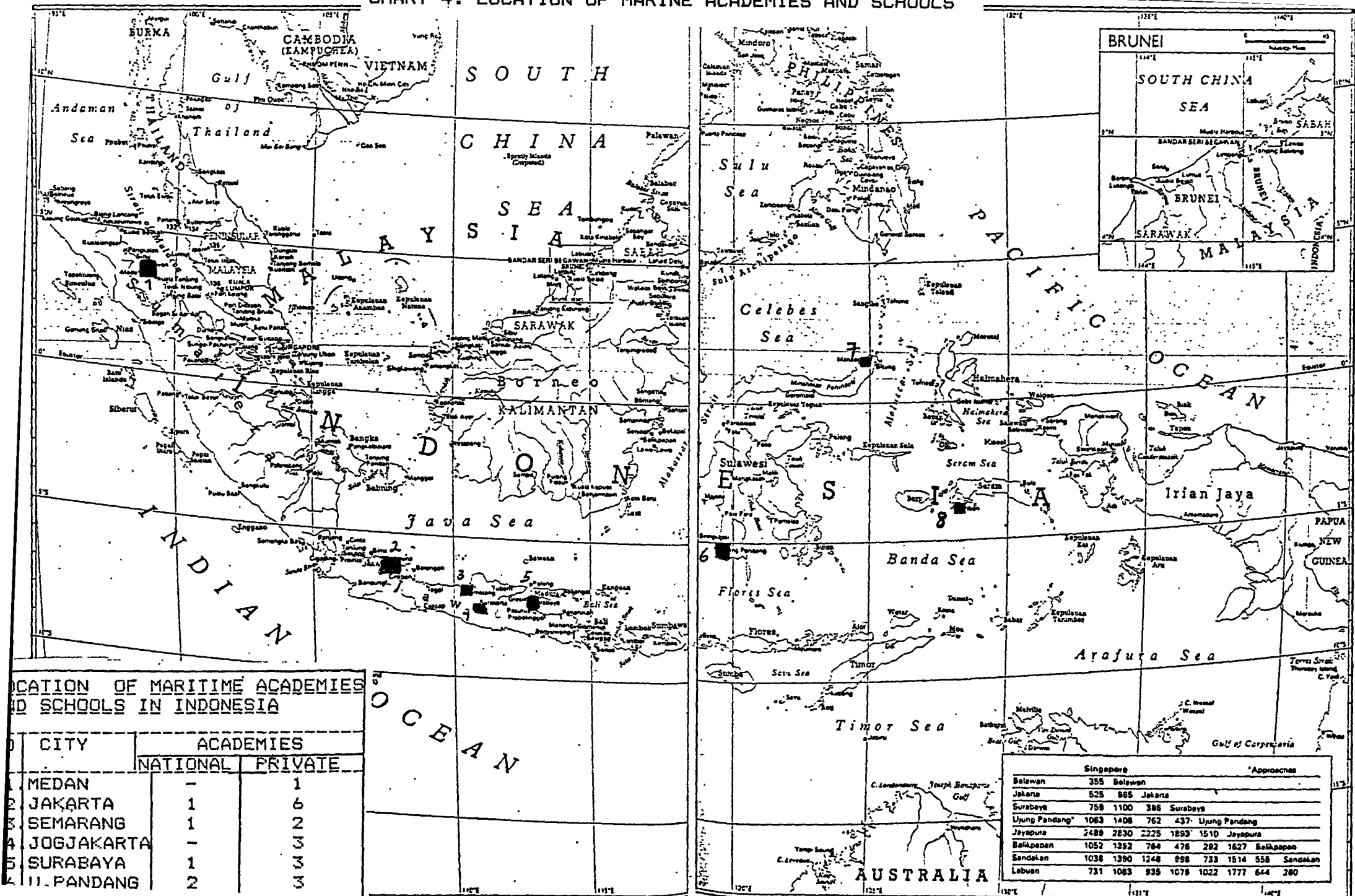
- Updating the curriculum contents according to the needs of the future shipping industry .
- Improving and extending training facilities.
- Upgrading the maritime lecturer and trainer levels.

The learning objectives must be reflected in the curriculum in order to justify what levels of qualifications can be achieved. Therefore there is a need for national MET improvement in order to meet the future international standard requirements.

The national MET level must be reflected in the :

- curriculum contents.
- objectives of teaching and learning.
- teaching and learning facilities.

To meet all the necessary requirements, there must be an independent body which consists of the ship owners, the maritime administration, the seaman's union and the training institutes to formulate and develop plans for the national MET systems.



IV. THE CURRENT STATE OF MARITIME EDUCATION AND TRAINING IN INDONESIA

4.1 Indonesian maritime education and training

4.1.1 Maritime education and training in Indonesia

Training and Education for seafarers in Indonesia is supervised by the Maritime Education and Training Center under the coordination of the Board of Training and Education of the Ministry of Communication . The basic functions of the MET Center are planning, evaluating, and supervising all the maritime institutes .

There are 3 national merchant marine academies , two ratings schools, one advanced maritime college and several private maritime academies. Chart 4)

Education and Training for maritime personnel is in two stages: one is the academic stage and the other the professional stage.

4.1.1.1 Academic stage.

In the academic stage, the students are prepared for the academic requirements including either school examinations or examinations for a certificate of competency.

After graduation from a college, they receive a certificate of competency issued by Director General of Sea Communication, and an academic diploma from the college which is accredited as a baccalaureate degree by the Ministry of Education and Culture.

4.1.1.2 Professional stage.

4.1.1.2 Professional stage.

In this stage, sea experience prepares the candidate for higher certificates of competency. This period belongs to the training component.

Examinations for certificates and the issuance of certificates are carried out by the National Examination Committee on behalf of the Director General of Sea Communication of the Ministry of Communication.

4.1.2 Regulations governing maritime training and education for seafarers.

Maritime Education and Training in Indonesia is governed by several national and international conventions.

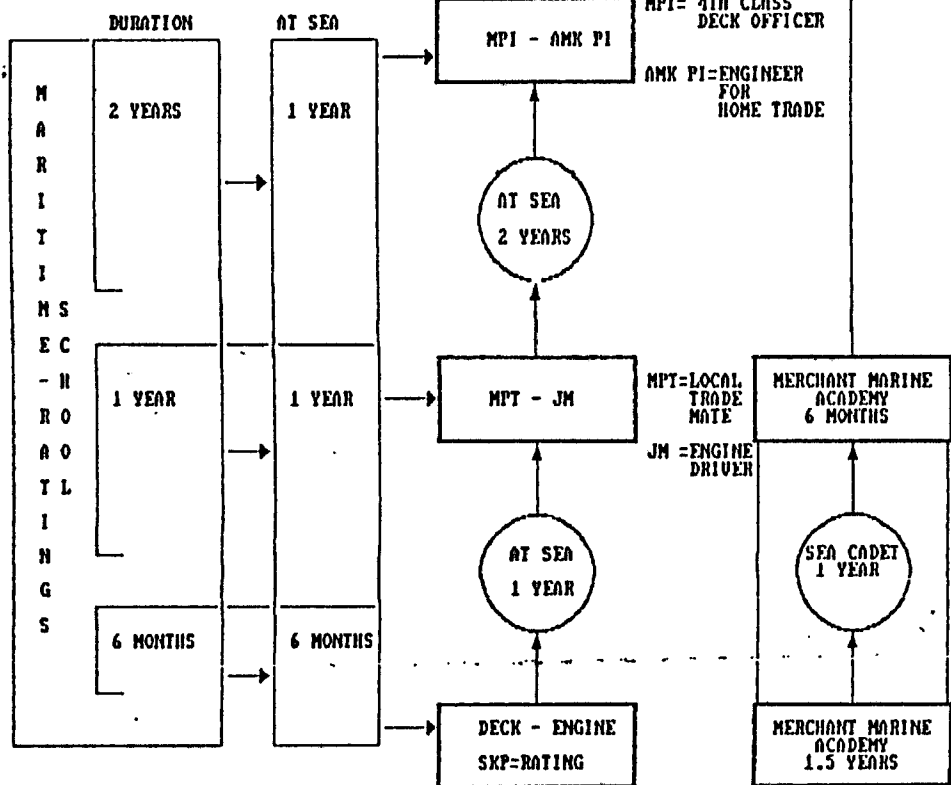
4.1.2.1 National regulations concerning maritime education and training :

- a. "Schepen Ordonantie & Schepen Verordening 1935", concerning the rights and duties of the seafarers on board ship.
- b. "Diploma Reglement 1939", regarding the examination and certification of seafarers, the rights and provisions for granting of certificates.
- c. Presidential Decree No. 34 , 1974;
- d. Presidential Decree No. 60 , 1986;
- e. Ministry of Education and Cultural Decree No.065/U/1981, regarding the accreditation of academic diplomas as baccalaureate degrees.
- f. Ministry of Communication Decree No. KM. 464/DL.005/Phb.1982, regarding the structure of academic stages in maritime education and training.

MPB I = FIRST CLASS DECK OFFICER
AMK C = FIRST CLASS MAR.ENGINEER

MPB II = SECOND CLASS DECK OFFICER
AMK B = SECOND CLASS MAR.ENGINEER

MPB III= THIRD CLASS DECK OFFICER
AMK A = THIRD CLASS MAR.ENGINEER



EDUCATION AND TRAINING
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- g. Director General of Sea Communication Decree No.DL.22/1/12/1985, regarding the ratification of STCW-1978 for the minimum standard requirements for training and certification for seafarers.
- h. Head of Education Board and Training Agency, Dept. of communications No. SK:591/DL.002/Diklat-90.

4.1.2.2 The international conventions concerning maritime education and training :

- a. The International Convention on Standards of Training , Certification and Watchkeeping for Seafarers (STCW-1978).
- b. The International Convention of Safety of Life at Sea (SOLAS - Convention) 1974 and Amendments.
- c. The International Regulations for Preventing Collisions at Sea, 1972 and Amendments 1981.
- d. The International Convention for the Prevention of Pollution from Ships 1973/1978

4.1.3 Maritime education and training and certification system in Indonesia.

4.1.3.1. MET system in Indonesia Diagram 5)

The training and education for seafarers is divided into several levels, starting from the ratings up to the Master's level:

Since the establishment of ratings schools in Indonesia in 1979, there has been a certification for ratings.

- .1 Ratings. There are two departments: deck and engine
Duration : 6 months, plus at least six months sea

service.

Certificate/Degree : SKP=Sertifikat Kecakapan

Pelaut=Ratings

Entrance requirement: secondary school graduate
(9 years secondary school)

Qualification: Able Bodied Seamen or Oiler for the
Engineroom.

Issuance of the certificates for the ratings is by
the respective harbour master.

At present there are only two ratings schools in
Indonesia which are :

- Barombong Rating School in Ujung Pandang,
Sulawesi Selatan.
- Surabaya Rating School in Surabaya ,Jawa Timur.

.2.a MPT = Mualim Pelayaran Terbatas or Local Trade
Mate (restricted coastal trade STCW -78)

Duration : one year at school (including six months
ratings school) in Barombong or Surabaya Rating
School plus at least 6 months sea service; or
through the examination which is held frequently
by the harbour master.

Certificate/Degree : MPT=Mualim Pelayaran Terbatas
or Local Trade Mate (restricted coastal trade),
issued by the respective harbour master.

Entry requirement: secondary school graduate.
(9 years).

Qualification for deck officer: Mualim Pelayaran

Terbatas = MPT (Local Trade Mate) or Officer in charge of a navigational watch on ships of less than 200 grt on coastal voyages.

For duties as master an endorsement for this qualification is needed.

- .2.b Juru Motor (JM) or Local Trade Engineers = Engineer on ships in local trades and engineer officer in charge of a watch on ships of limited power on inter-island voyages.

Duration : one year at school (including six months ratings school) at Barombong or Surabaya Ratings School plus at least 6 months sea service, or through the examination which is held frequently by the harbour master, plus at least 6 months sea services .

Certificate/Degree : JM=Juru Motor = Engine Driver or Local Trade Engineer, issued by the respective harbour master.

Entry requirement: secondary school graduate.

Identical with IMO regulations, there is no provision for the certification of engineer officers on ships of less than 750 KW power.

- .3.a MPI = Mualim Pelayaran Interinsulair or 4th Class Deck Officers (STCW - 1978).

Minimum entry requirement: secondary school graduate (9 years) .

Certificate/Degree :MPI=Mualim Pelayaran
Interinsuler=Home Trade Mate or 4th Class Deck
Officer, issued by the National Examination Board
for Marine Officers on behalf of the Director
General of Sea Communication.

Duration : 3 years (2 years at school and one year
at sea as cadet)

Qualification : Watchkeeping officer on ships of
200 grt or more on coastal voyages.

For duties as master an endorsement for
qualification is needed.

.3.b AMK PI = Akhli Mesin Kapal Interinsuler or Engineer
for Home Trade Services.

Minimum entry requirement: secondary school
graduate (9 years) .

Certificate/Degree :AMK PI= Akhli Mesin Kapal
Pelayaran Interinsuler or Engineer for Home Trade
Services, issued by the National Examination Board
for Mates and Marine Engineers on behalf of the
Director General of Sea Communication.

Duration : 3 years (2 years at school and one year
at sea as cadet)

Qualification : Second engineer on board passenger
ships with engine propulsion of less than 2.500 HP
(746 KW) and cargo ships of less than 2.500 HP
(1,865 KW) for ocean going voyages.

Or to serve as a Chief Engineer on board passenger ships with engine propulsion of 500 - 1500 HP (373 -1,865 KWE) and cargo ships of 1000 - 2500 HP (746 -1865 KW) for extended archipelagic voyages.

- .4.a MPB III = Mualim Pelayaran Besar III or 3rd Class Deck Officers (STCW - 78)

Minimum entry requirements:high school graduate (12 years), majoring in physics and mathematics.

Certificate/Degree : 1.MPB III=Mualim Pelayaran Besar III or 3rd Class Deck Officers (STCW - 78), issued by the National Examination Board for Mates and Marine Engineers on behalf of the Director General of Sea Communication.

2.Strata A Diploma=Academic Degree(Baccalaureate) for graduates of Merchant Marine Academies

Duration : 3 years (including 1 year as cadet), through a merchant marine academy, or 1 year refresher course for a holder of MPI certificate with at least one year sea service.

Student intake per year: 300 midshipmen

Number of graduates per year : Average 210 officers.

Qualification for 3rd Class Officers:

-To serve as Second Mate on passenger ships of 2,500 - 5000 grt and cargo ships of 5,000 - 7,500 grt for ocean going trade

-To serve as Chief Mate on board passenger ships of 750 grt - 2,500 grt and on cargo ships of 2,500 - 5,000 grt for ocean going trade.

-To serve as Master on board ocean going ships of less than 750 grt.

.4.b AMK A = Akhli Mesin Kapal A (3rd Class Engineer)

Minimum entry requirements: high schools graduate (12 years), majoring in physics and mathematics.

Certificate/Degree :1.AMK A=Akhli Mesin Kapal A = 3rd Class Deck Engineers (STCW - 78),issued by the National Examination Board for Mates and Marine Engineers on behalf of the Director General of Sea Communication.

2.Strata A Diploma=Academic Degree(Baccalaureate) for graduates of merchant marine academies.

Duration : 3 years (including 1 year as cadet), through a merchant marine academy, or 1 year refresher course for a holder of AMK PI certificate, with at least one year sea service.
Student intake per year: 300 midshipmen
Number of graduates per year : Average 210 officers.

Qualification for 3rd Class Engineers (AMK - A)

-To serve as 2nd Engineer on board passenger ships with engine propulsion of 5000 HP and on cargo ships of more than 10,000 HP for ocean going

voyages

-To serve as First Engineer on board passenger ships with engine propulsion of 1,000 - 2,500 HP (716 KW -1,865 KW) and cargo ships of 2,500 - 5,000 HP (1,865 -3,730)KW on ocean going voyages.

.5.a MPB II = Mualim Pelayaran Besar II (2nd Class Deck Officers STCW-1978).

Entry requirement : Holder of 3rd Class Officer certificate with a minimum two years of sea service.

Certificate/Degree :1. MPB II = Mualim Pelayaran Besar II (2nd Class Deck Officers STCW-1978), issued by the National Examination Board for Mates and Marine Engineers on behalf of the Director General of Sea Communication.

2. Strata B Diploma=Advanced Degree(Baccalaureate) for graduates of Strata B Program (Advanced Maritime College), which is accredited as first degree university level=S1.

Duration : one year.

Qualification for 2nd Class Deck Officers:

-To serve as Second Mate on board passenger ships of not more than or equal to 5,000 GRT, and on cargo ships of not more than or equal to 7,500 GRT , unrestricted voyages.

-Competence as Chief Mate on board passenger ships of 2,500 - 5,000 grt and on cargo ships of

5,000 -7,500 GRT, unrestricted voyages.

-Competence as Master on board passenger ships of 750 - 2,500 grt and on cargo ships of 2,500 - 5000 grt.

IMD Recommendation : Qualification for master on ships of limited size on interisland voyages by endorsement.

.5.b AMK B = Akhli Mesin Kapal B (2nd Class Engineers)

Entry requirement : Holders of 3rd Class Engineer certificate= AMK A, with a minimum two years sea service.

Certificate/Degree :1. AMK B=Akhli Mesin Kapal B (2nd Class Engineers), issued by the National Examination Board for Mates and Marine Engineers on behalf of the Director General of Sea Communication.

2. Strata B Diploma=Advanced Degree(Baccalaureate) for graduates of Strata B Program (Advanced Maritime College), which is accredited as first degree university level=S1.

Duration : one year.

Qualification for AMK B=2nd Class Engineer:

-Competence as Second Engineer on board passenger ships with engine propulsion of not more than 5,000 HP and on cargo ships of < 10.000 HP (7,460 KW), unrestricted voyages.

-Competence as First Engineer on board passenger ships with engine propulsion of < 5,000 HP (3,730 KW) and cargo ships of < 10,000 HP (7460 KW), unrestricted voyages.

-Competence as Chief Engineer on board passenger ships with engine propulsion of 2,500 - 5,000 HP (1,865 -3,730 KW) and cargo ships of 5,000 - 10,000 HP (3,730 -7,460 KW) ,unrestricted voyages.

.6.a MPB I = Mualim Pelayaran Besar I (First Class Deck Officer) and AMK B (Akhli Mesin Kapal B) or First Class Engineer.

Entry requirement: holder of 2nd Class Officer certificate with a minimum of two years sea service.

Certificate/Degree :1. MPB I = Mualim Pelayaran Besar I (First Class Deck Officer STCW-1978), issued by the National Examination Board for Mates and Marine Engineers on behalf of the Director General of Sea Communication.

2. Strata C Diploma=Advanced Degree (Master) for graduates of Strata C Program (Advanced Maritime College), which is accredited as post graduate university level=S2.

Duration : one year.

Qualification for First Class Deck Officer:

- Competence as Chief Mate on board any type of ship, unrestricted voyages.

- Competence as Master of any ship with provision that at least one of the mates must have the same first class certificate.

.6.b AMK C = Akhli Mesin Kapal C (First Class Engineer)

Entry requirement : holder of 2nd Class Engineer certificate= AMK B, with a minimum of two years sea service.

Certificate/Degree :1. AMK C=Akhli Mesin Kapal C (First Class Engineers), issued by the National Examination Board for Mates and Marine Engineers on behalf of the Director General of Sea Communication.

2. Strata C Diploma=Advanced Degree(Master) for graduates of Strata C Program (Advanced Maritime College), which is accredited as post graduate degree university level =92.

Duration : one year.

Qualification for First Class Engineer:

- Competence as Chief Engineer on ships regardless of power of engine propulsion.

Comments: Comparison of STCW - 1978 levels with the National MET level shows near similarity in terms of competency levels. However in the competency application , due to national regulations , there is a certain restriction on the holders of MPB II (2nd Class Deck Officers) certificates: they may not be qualified to serve as a Chief Mate on cargo

ships above 7500 GRT or passenger ships above 5000 grt .

With reference to STCW-1978, the holder of a 2nd Class Deck Officer certificate is qualified for chief mate , unlimited , on unrestricted voyages.

Also there is a restriction on the holder of an MPB I certificate (First Class Deck Officer).

In spite of the qualification as a Master for any ship, on unrestricted voyages, there is a provision that his chief officer must also hold an MPB I certificate.

In the case of the STCW -78 convention, for First Class Deck Officer certificate holder is qualified as master of any ship on unrestricted voyages, i.e. no restrictions for services as a Master.

4.1.3.2 National Entry Requirements :

Require- ment for Certific.	Age	Education	Minimum and Sea Ser-	Minimum Entry / Certificate Required
	16	6 months	6 months	-
MPT	19	1 year	1 year	-
JM	19	1 year	1 year	-
MPI	19	2 years	1 year	Sec.school 9 years
AMK PI	19	2 years	1 year	Sec.school 9 years

or

Require- :	:Education:	Minimum :	Minimum Entry /
ment for :	Age :	and :	Sea Ser-: Certificate
Certific.:	:Training :	vice req:	Required

MPI : 19 :1 year : 1 year : MPT

AMK PI : 19 :1 year : 1 year : JM

MPB III : 19 :2 years : 1 year : Sec.school 12 years

AMK A : 19 :2 years : 1 year : Sec.school 12 years
or

MPB III : 19 :1 year : 1 year : MPI

AMK A : 19 :2 years : 1 year : AMK PI

MPB II : :1 year : 2 years : MPB III

AMK B : :1 year : 2 years : AMK A

MPB I : :1 year : 2 years : MPB II

AMK C : :1 year : 2 years : MPB II

In order to obtain MPB I=First Class Deck Officer and
AMK B =Chief Engineer certificates, the requirement is at
least 5 years sea service and at least four years shore
based training, without interruptions.

Certification for Marine Radio Officer:

-Radio Communication Operator's General Certificate for
Maritime Mobile Service.

-First Class Certificate for Radio Telegraph Operators

-Second Class Certificate

-Radio Telegraph Operator's Special Certificate

-Radiotelephone Operator's General Certificate

-Radiotelephone Operator's Restricted Certificate

The examinations for Radio Operators are supervised by Dewan Telekomunikasi Indonesia.

4.1.3.3. Specialized Training /Up-dating Course / Refresher Course

To meet STCW - 1978 requirements there is a need for specialized training of marine personnel. Short course models are provided, on : - Training Course in maritime personnel survival

techniques, which is held periodically in the Merchant Marine Academies in Jakarta, Semarang, Ujung Pandang and at the Ratings School Barombong.

- Training Course in basic fire-fighting, also available at the same institutions as mentioned above
- Training for Radar Observer, available in Jakarta Merchant Marine Academy
- Oil Tanker Safety Training, available through the state oil company PERTAMINA
- Chemical tanker safety training.
- LPG tanker safety training.
- Training in dangerous cargo.
- Ship handling simulator training.
- ARPA course, available at the Jakarta Merchant Marine Academy
- First Aid and Medical Guide Training, available at Jakarta, Semarang and Ujung Pandang Merchant Marine Academies and at the state oil company Pertamina.

For specialized training courses on special purpose ships do not yet exist for the reason that there are no specialized ships in the national fleet, only tanker and general cargo ships.

4.1.3.4 Conclusion on the present MET system:

-The Curricula of the present systems compared to STCW - 1978 are similar except for the special training courses which lack training facilities.

List of Total Number of Certified Officers until 1990.

MPB I (First Class Deck Officers)	:	1019
MPB II (Second Class Deck Officers)	:	1678
MPB III (Third Class Deck Officers)	:	5063
MPI (Fourth Class Deck Officers)	:	4525
MPT (Local Trade)	:	N.A
AMK C (First Class Engineer)	:	339
AMK B (Second Class Engineer)	:	992
AMK A (Third Class Engineer)	:	3877
AMK PI (Home Trade Engineer)	:	4693
JM/JS (Local Trade Engineer)	:	N.A

Source : Training and Education for Seafarers in Indonesia

The Average Annual Output of Indonesian Marine Officers
from 1981 - 1989.

MPB I	:	53
MPB III	:	284
MPB II	:	92
MPI	:	150
AMK C	:	22
AMK B	:	57
AMK A	:	221
AMK PI	:	213

Source: Compiled from Training and Education for Seafarers

in Indonesia.

A comparison of the average output with the country's population shows that MET is very small in Indonesia. This small system presently provides an oversupply to the national fleet, but looking at the international demands, particularly in Singapore and other countries in the region, it is clear that the huge human resources of Indonesia represent a big potential for supplying the needs of the world fleet in the future.

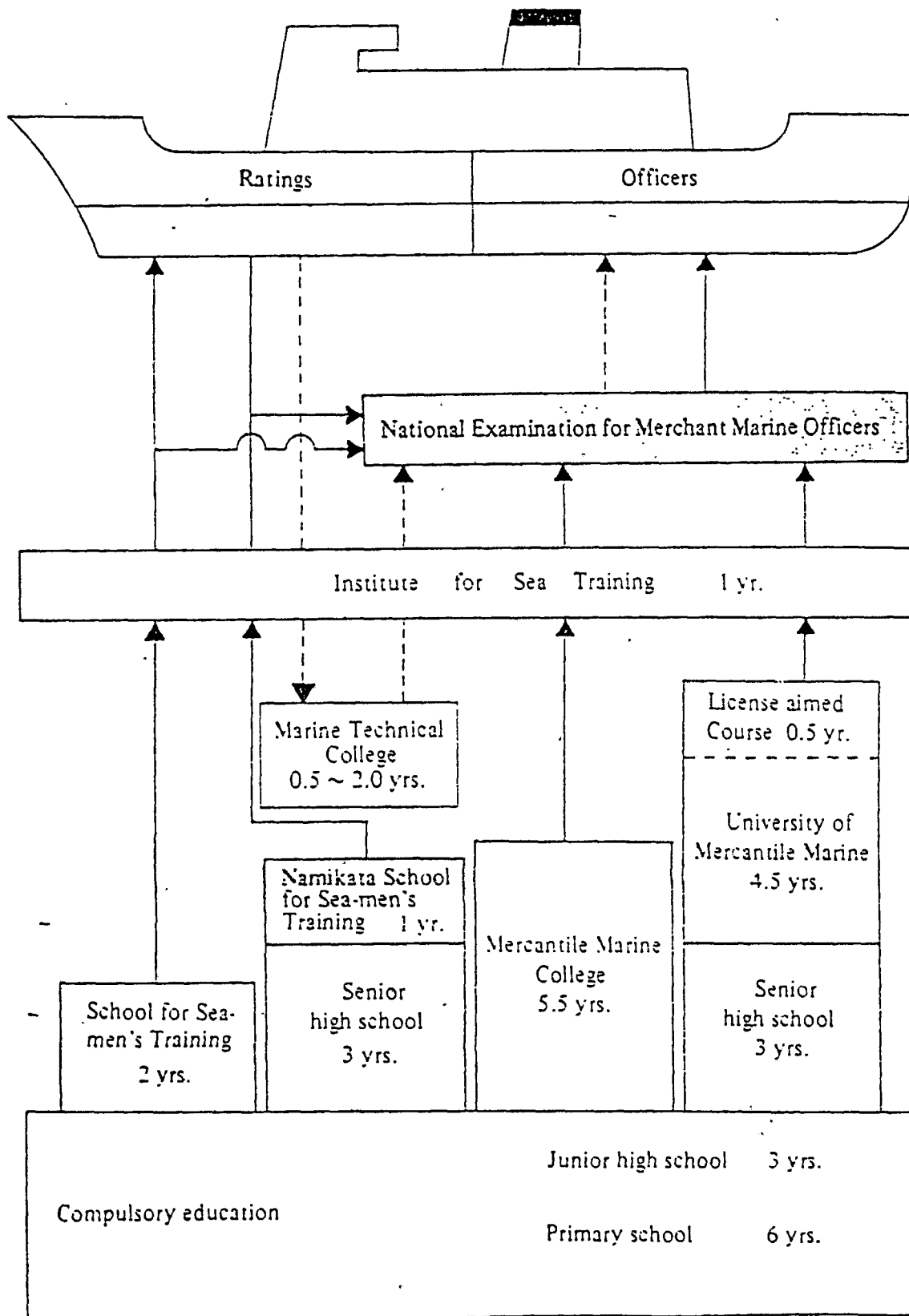
When our human resources are accepted in the region and on the international market, then Indonesia will have the opportunity to provide highly qualified seafarers (well-trained crew and officers) .

By well-trained crew and officers, we mean that they will satisfactorily meet the internationally accepted requirements and be able to cope with situations on board modern ships.

Indonesian MET should adapt its planning to reach those levels in the future. The minimum international standard of training and certification, as laid down in the STCW - 1978 convention, thereby have to be regarded as absolute minima. Actual MET levels for future purposes should go beyond these minimum levels.

DIAGRAM 6.

Diagram of Merchant Marine Education System



4.2 Comparison of MET and certification in various countries:

4.2.1 MET System in Japan :

Diagram 6)

4.2.1.1 School for Seamen's Training

a. Jurisdiction : Ministry of Transport

b. Entrance requirements:

- Secondary school graduates at the age of 15 to 19.
For hometrade officers course, candidates must be graduates of upper secondary school at the age of 18 to 20
- Must pass the entrance examinations consisting of written examination and physical checkup.

c. Level of training : (Advanced Course)

Leaders of medium standing in the deck crew and engineering crew of ocean-going vessels;
hometrade officer for the coastal service.

d. Training duration :

Two years for leaders of medium standing;
one year for Hometrade Master and Engineering section.
The students must stay in the boarding house. Tuition, boarding and textbooks are free, provided by the supporting organization or company.

e. Licences and qualifications:

The graduates of advanced courses, after having acquired sea service on board a ship for one and a half years are exempted from the written examination for the fifth grade maritime officer (navigation) or fifth grade maritime officer (engineering). Those who have graduated from the hometrade officers course will be exempted from the written examinations for the fourth grade maritime

officer (navigation) or the fourth grade maritime officer (engineering) after two years of sea service on board ships.

Those who have completed the A course of the (correspondence education, general course,) of the marine technical college shall, after graduating from the advanced course, qualify as being equal to the graduates of an upper secondary school.

Those who have graduated from the advanced course and completed this A course are exempted from the entrance examination of the Marine Technical College , after designated years of sea service.

The graduates of the Marine Technical College shall be exempted from the written examinations of the third grade maritime officer (navigation) or third grade maritime officer (engineering).

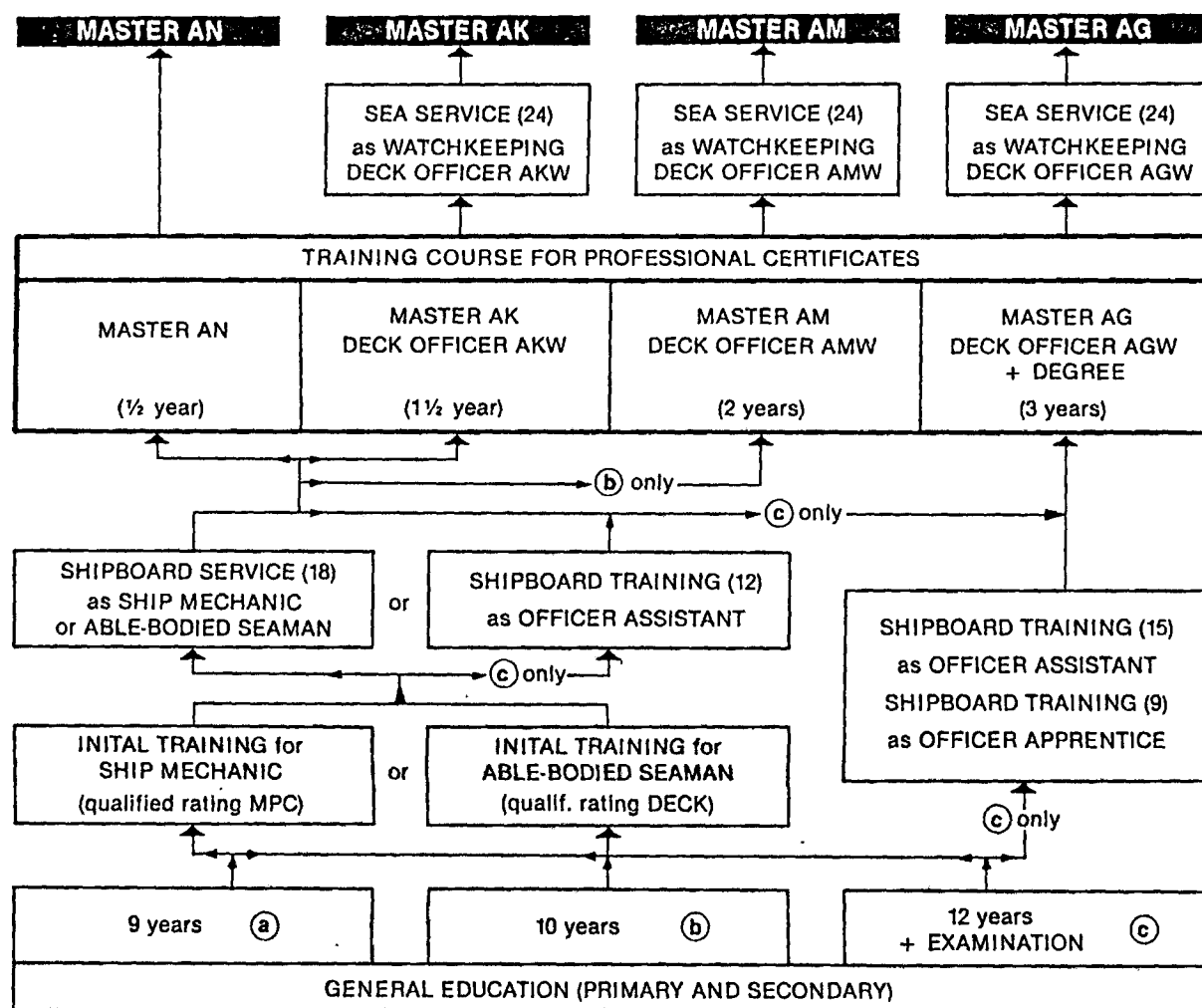
4.2.1.2 Institute for Sea Training.

Institute for Sea Training for the students of the Mercantile Marine Universities and the Mercantile Marine Colleges as the graduates of those institutions are the principal sources of Japanese ocean - going merchant marine ship officers qualified as first grade officers.

The objective of the IST is to train students of the mercantile marine universities and colleges aboard the training ships of the IST to instill proper mental attitudes as merchant marine officers while training them in various skills needed aboard ship.

The training term in IST is one year for the navigation

Maritime Training Courses in the Federal Republic of Germany

General Scheme of Nautical Training
for Deck Officer and Master Licences

number in () = duration in months

Remarks

Analogical Scheme for Fishery and Engineer Licences

course students and 9 months for engineering course students plus 3 months in the dockyard.

4.2.2 MET System in Germany:

a. Bremen Polytechnic, School For Maritime Studies.

Diagram 7)

-General Scheme of Nautical Training for Deck Officer and Master Licences :

In Germany, Bremen Polytechnic, Department of Nautical Studies , the courses are leading to Master Mariner Certificate. Unlike in any other countries ,prior to the Master's level, the candidate must hold at least a second mate and a chief mate certificate before going on to the master's certificate.

There are 4 type of Master Licence Courses. However, that does not necessarily mean that the holder of the certificate can serve directly as a master. He must start according to the normal procedure as a third mate and upward. It takes almost ten years of service at sea as an officer before he can actually serve as the master of a ship.

1 Master AG Course:

Certificate/Degree Obtained: DECK OFFICER AGW /
Polytechnic Degree in Nautical Science
Qualification : Foreign Going Trade (Unlimited Tonnage)
Course Duration : 3 years

Minimum Entry Requirements:

1. Graduates of primary and secondary schools (12 years).
- 2.1 Must have been trained as a ship mechanic 1) or Able-Bodied Seaman 2) and 18 months shipboard service as ship mechanic, respectively applied to able-bodied seaman, or instead of 18 months shipboard service) 12 months training as an officer assistant. or
- 2.2 Nine-months shipboard training as an officer assistant.

Course Contents:

Basic studies : -mathematics, physics, chemistry
(first part) -information (EDP)
 -basic economics, basic law
 -psychology/ sociology
 -naval architecture, marine
 engineering
 -medical training

Advanced studies:

-navigation, maritime law, seamanship/
 ship technology (simulator training:
 radar + shiphandling)
-meteorology/ oceanography
-maritime economics and shipping
 management
-automation
-personnel management
-nautical English
-passage planning and shipmaster's
 business

Remarks:

- 1) "Ship Mechanic" = qualified rating for deck and engine room service (multi purpose crew)
- 2) The training of A.B has been cancelled since 1986.

.2 Master AM Course:

Certificate/Degree Obtained: DECK OFFICER AMW /
State-examined Mariner

Qualification : Foreign going trade (limited to 4000 grt)

Course Duration : 2 years

Minimum Entry Requirements:

1. Graduates of primary and secondary schools (10 years).
- 2.1 Must have been trained as a ship mechanic 1) or Able-Bodied Seaman 2) and 18 months shipboard service as ship mechanic, respectively able-bodied seaman

Course Contents:

- navigation, maritime law, seamanship/
ship technology (simulator training:
radar + shiphandling)
- meteorology/ oceanography
- personnel and work management
- English
- communications
- medical training
- marine engineering
- German language
- politics and shipping management
- mathematics, physics and chemistry.

The course considerably exceeds the STCW-1978

COURSE SYLLABUS
Master Foreign Going (AG)

Fundamental Studies

Subject	1st semester		2nd semester		Total
	LHW	EX	LHW	EX	Hours
Communications	4	1	2	1a)	102
Medical Training	2	-	2	1	68
Sociology	4	1	-	-	68
Psychology	-	-	2	1	34
Mathematics	4	1	-	-	68
Physics (mechanics)	4	1	-	-	68
Physics (electricity)	-	-	4	1	68
Chemistry	-	-	2	1	34
Informatics EDP	4	1	-	-	68
Climatology/Oceanography	-	-	4	1	68
Basic Maritime Law	-	-	2	1	34
Economic Fundamentals	2	-	2	1	68
Shipbuilding	2	1	-	-	34
Operation of Ship Engines	-	-	4	1	68

LHW = Lecture Hours (45 minutes) per week

EX = Examination, test, qualification at the end of semester

a) = General VHF Certificate

Advanced Studies

Subject	3rd semester		4th semester		5th semester		6th semester		Total
	LHW	EX	LHW	EX	LHW	EX	LHW	EX	Hours
English Language for Mariners	2	1a)	2	-	2	1	-	-	102
Personnel Management	2	-	2	1	-	-	-	-	68
Automation	2	1	2	1	-	-	-	-	68
Shipping Management	2	1	2	-	2	1	-	-	102
Weather Routing	2	-	2	1	2	1	-	-	102
Terrestrial Navigation	4	-	2	1	-	-	-	-	102
Celestial Navigation	-	-	4	-	2	1	-	-	102
Electronic Navigation	-	-	-	-	4	-	4	2	136
Marine Labour Law	2	1	-	-	-	-	-	-	34
Marine Trade Law	-	-	2	-	2	1	-	-	68
Sea Traffic Law	-	-	-	-	4	-	2	1	102
Stability/Trim	4	1	-	-	-	-	-	-	68
Dangerous Cargoes	3	1b)	-	-	-	-	-	-	51
Stowage of Cargo	-	-	2	-	2	1	-	-	68
Manoeuvring	-	-	-	-	2	-	2	1	68
Ship Safety	-	-	2	1	-	-	-	-	34
Simulator Training	-	-	1	-	-	-	-	-	17
Terrestrial Navigation	-	-	-	-	-	-	-	-	17
Simulator Training	-	-	-	-	-	-	2	-	34
Anticollision (Radar Simulator)	-	-	-	-	-	-	-	-	34
Simulator Training	-	-	-	-	-	-	1	-	17
Anticollision (Navigation Lights Sim.)	-	-	-	-	-	-	-	-	17
Simulator Training Shiphandling	-	-	-	-	-	-	2	-	34
(Shiphandling Simulator)	-	-	-	-	-	-	-	-	34
Seminar Passage Planning	-	-	-	-	-	-	6	-	102

LHW = Lecture Hours (45 minutes) per week

EX = Examination, test, qualification at the end of semester

a) = IMO Standard Marine Navigational Vocabulary

b) = Inclusive Radiation Protection Measures

COURSE SYLLABUS
Master Medium Range (AM)

Subject	1st semester	2nd semester	3rd semester	4th semester	Total
	LHW	LHW	LHW	LHW	Hours
Shipping Management/Politics	2	2	-	-	68
German Language	2	2	-	-	68
English Language	4	4	2	-	170
Mathematics	4	4	4	-	204
Physics	4	4	2	-	170
Chemistry	-	-	4	-	68
Personnel Management	-	-	-	4	68
Navigation	-	4	6	8	306 ¹⁾
Maritime Law	4	4	4	6	306 ¹⁾
Seamanship	2	4	4	8	306 ¹⁾
Communications	-	2	2	-	68
Medical Training	4	-	-	-	68
Operation of Ships' Engines	4	-	-	-	68
Meteorology	-	-	2	4	102

LHW = Lecture Hours (45 minutes) per week

1) additional Simulator Training

COURSE SYLLABUS
Master Coastal Range (AK)

Subject	1st semester	2nd semester	3rd semester	Total
	LHW	LHW	LHW	Hours
Shipping Management/Politics	2	2	-	68
German Language	2	2	-	68
English Language	4	2	4	170
Mathematics	4	4	-	136
Physics	-	2	-	34
Chemistry	-	2	-	34
Personnel Management	-	-	4	68
Navigation	4	6	6	272 ¹⁾
Maritime Law	4	4	6	238 ¹⁾
Seamanship	4	4	6	238 ¹⁾
Communications	2	2	-	68
Medical Training	4	-	-	68
Operation of Ships' Engines	2	2	-	68
Meteorology	-	-	4	68

LHW = Lecture Hours (45 minutes) per week

1) additional Simulator Training

requirements levels.

.3 Master AK Course:

Certificate/Degree Obtained: DECK OFFICER AKW /

Qualification : Near continental trade (limited to 1000
grt)

Course Duration : 1 1/2 years

Minimum Entry Requirements:

1. Graduates of primary and secondary School 9 years.
- 2.1 Must have been trained as a ship mechanic 1) or
Able-Bodied Seaman 2) and 18 months shipboard
service as ship mechanic, respectively able-bodied
seaman

Course Contents:

- navigation, maritime law, seamanship/
ship technology (simulator training:
radar + shiphandling)
- meteorology
- personnel and work management
- English
- communications
- medical training
- marine engineering
- German languages
- politics and shipping management
- mathematics, physics and chemistry.

The course considerably exceeds the STCW-1978
requirements.

.4 Master AN Course:

Duration : 1/2 year.

Course Syllabus for all courses:

List 8)

b. HAMBURG POLYTECHNIC, SCHOOL FOR MARITIME STUDIES,
(see: Diagram).

Degree: Dipl.Ing for Ship Operation Course.

In 1989, the Hamburg Polytechnic, Fachhochschule, School of Maritime Studies changed the Traditional Maritime Education and Training System for Master Licences to the Integrated MET system leading to the level of Dipl. Ing fur Schiffbetrieb (Master's Degree for Ship Operation)

Duration : 4 years (8 Semester)

Qualification /Degree Obtained :Dipl.Ing.fur
Schiffsbetrieb (Master's Degree for Ship Operation).

Course Contents:

Mathematics	- 12 hrs/Week
Data Processing	- 8 "
Physics Lab.	- 4 "
Mechanics	- 4 hrs/Week
Stress/Tensions	- 4 hrs/Week
Thermodynamics	- 10 hrs/Week
Electrotechniques	- 8 hrs/Week
Electronics	- 6 hrs/Week
Electrical Engines	- 8 hrs/Week
Control Systems	- 18 hrs/Week
Engine Elements	- 4 hrs/Week
Engine Dynamics	- 4 hrs/Week
Steam Techniques	- 6 hrs/Week
Combustion Engine	- 10 hrs/Week
Work and Ancillary Engines	- 10 hrs/Week

Materials	- 4 hrs/Week
Lab. Chemistry	- 2 hrs/Week
Dangerous Materials	- 4 hrs/Week
Ship Materials (Fuel)	- 4 hrs/Week
Maritime Law	- 14 hrs/Week
Ecology	- 4 hrs/week
Maritime Economics	- 6 hrs/week
Personnel Management	- 4 hrs/week
English	- 8 hrs/week
Meteorology	- 4 hrs/week
Seamanship	- 14 hrs/week
Communications	- 2 hrs/week
Navigation	- 14 hrs/week
Simulator Training	- 6 hrs/week

Total :	206 hrs/week *
	18/Semester =3708 hrs.

Minimum Entry Requirements:

1. Graduate of primary and secondary schools (12 years).
- 2.1 Must have been trained as a ship mechanic 1) or Able-Bodied Seaman 2) and 18 months shipboard service as ship mechanic, respectively able-bodied seaman, or instead of 18 months shipboard service) 12 months training as an officer assistant. or
- 2.2 Nine-months shipboard training as an officer assistant.

4.2.3 MET System in France

France is the first country in the world to start a dual purpose training scheme for deck and engine in 1967. The system is called Polyvalent Training, which is one certificate for dual qualifications. The training leads to the highest level of competency on deck and marine engineering.

-Level I : This is the highest level of maritime training in France corresponding with the stream for Captain First Class of the merchant navy (C1NM), and the main characteristic is a polyvalent system where the officers can either work on the bridge or in the engine room.

Qualification : Master Mariner and Chief Engineer for all type of ships

Certificate /Degree Obtained : C1NM

Duration: 4 years

The first academic year consists of 30 weeks of study and at least one month's shipboard service then followed by examinations.

The second academic year also lasts 30 weeks plus shipboard service of 4 months (included in the first year); then an examination follows.

The third academic year consists of 30 weeks, then the major examination for the diploma for a merchant marine cadet, followed by 10 months of shipboard service as cadet.

The Certificate of Competency as a Dual Purpose Officer (Brevet d'Officier de la Marine Marchande) is awarded

upon completion of the sea service above.

Further 10 months shipboard services as 4th and 3rd Officer on deck or in the engine room, including at least 3 months in each of two departments.

Lastly, the fourth academic year consists of 30 weeks plus major examinations for a diploma in higher studies of the merchant marine, which entitles the holder to sail as chief mate or second engineer.

The polyvalent certificate of competency ,C1NM,will be obtained after the effective seetime is completed; this is five years, of which at least 16 months have to be spent on deck and in the engine room each. The holder of a certificate is entitled to serve on ships of all sizes worldwide as master or chief engineer.

ASSESSMENT AND CERTIFICATION

The examination consists of a practical and a written test (each 28%), and an oral test (44%) .The practical test is held in school by the technical instructors and the written and oral tests are organized, supervised, and marked under the control or supervision of the Inspectorate General of Maritime Education and Training.

-Level II : This level leads to a Second Class Master's Certificate of Competency for ships up to 7500 GRT or 7500 KW. They are also trained in a polyvalent system.

Certificate /Degree Obtained : C2NM

Duration: 3 years

ENTRANCE REQUIREMENTS.

- 12 years of general education ,majoring in mathematics, physics and technical subjects.
- Holders of baccalaureates
- Fulfill medical requirements as stipulated by the Maritime Administration.
- Holding a Swimmer's Certificate in compliance with the French National Swimming School regulations.
- Age Minimum of 18 years.

4.2.4 MET System of the Netherlands:(Marof)

The Netherland's Maritime Officers training scheme:

Duration : 4 years

First academic year at school (2 semesters including sea training on training ships).

2nd academic year at sea for at least one year with activities recorded in the "Trainee's Work Book", which contains a check list of operational skills and the number of items on which the trainee will make a report to the institute.

3rd and 4th academic years are spent at school and include mandatory courses in accordance with the STCW-78 Convention.

Final examinations are held in the final stage of the course including submission of a thesis.

Admission:- H.A.V.O certificate or Atteneum.

- Pass Physical, eye sight, and oral tests.

Qualification: 3rd Maritime Officer who can serve
either in engine room or on deck.

Certificate and Degree Obtained: Bachelor of Science
Degree (by the Dept.of Education)
MAROF 3 Certificate (Min. Transport)

To obtain the higher level certificate (Marof 2), they
only have to have sea service of at least two years in the
capacity of maritime officer, which means serving as an
integrated officer(Deck and Engine), then attending a
refresher course if it is mandatory. The certificate will
be in the mailbox after completion of the two years
service. The same thing applies for the highest level
(Marof 1) certificate.

4.2.5 MET System in Sweden :

Entry Requirements :

- Completion of primary and secondary schools (9 years)
schools,plus,
- 2 years of higher schooling including one year of vessel
training and another year of seagoing practice, or just
30 months of seagoing service.

Training level : For Mates class, the requirement is
two years study with basic studies of 80 points. One
point is equal to 1 week, so at least 80 weeks are spent
in the school in two years time. In this period they
also have a 48 points of studies for watchkeeping
officer and 20 points for "Skipper A" for Captain
class.

For mates class in order to become Captain Class
("SKIPPER A") ,in addition to 80 points, required one

year study in which 40 points studies obtained.

1 point = 1 Week

Certification of Competency :

4.2.5.1 Master Foreign Going (K) :

The candidate must have passed the Captain's Class and obtained a certificate of competency as Mate A or B, and the candidate must have been employed for at least 36 months on board merchant ships with a gross tonnage of at least 200.

Not less than 18 months of this period of service must have been served at sea in an extended coastal trade or more extensive trade, including at least 9 months on board a ship of 1200 grt. as master or chief officer, or as mate on board a ship of at least 3000 grt. in a restricted ocean trade or ocean trade.

4.2.5.2 Mate A :

The candidate must have passed the examination for a mate (University certificate of 80 points = Mate Class) and the candidate must have completed at least 36 months of deck service of which not less than 27 months must have been served in extended coastal trade or more extensive trade , including at least 12 months on board a merchant ship of at least 1200 grt in a North Sea trade or more.

In the case of a person who has served as assistant officer in the North Sea trade or other more extended trade for at least six months, the total period may be reduced to 30 months.

4.2.5.3 Mate B :

The candidate must have obtained a certificate of an approved 48-point-study-program from a nautical school or must have obtained a mate training course certificate (one academic year) at a school of navigation, and must have completed at least 36 months deck service of which not less than 18 months must have been served in extended coastal trade or more, including 9 months or more on board a merchant ship of at least 200 grt in the North Sea Trade. In the case of an assistant officer in the North Sea or more extended trade for at least six months, the total period may be reduced to 30 months.

4.2.5.4 SKIPPER A:

The candidate must have obtained a university course matriculation certificate of a Skipper A (20 Points) or must have a Skipper First Class training at a school of navigation, and must have completed 36 months of deck service, including 18 months in extended coastal trade, including 12 months on board a merchant ship. In the case of a person who has served as an assistant officer for at least 6 months, the total period may be reduced to 30 months.

4.2.5.5 Skipper B:

The candidate must have obtained a skipper's examination certificate and at least 36 months of deck service of which 12 months were on board a merchant ship.

UNITED STATES MERCHANT MARINE ACADEMY
KINGS POINT

PROGRAM SEQUENCE
4 YEARS STUDY

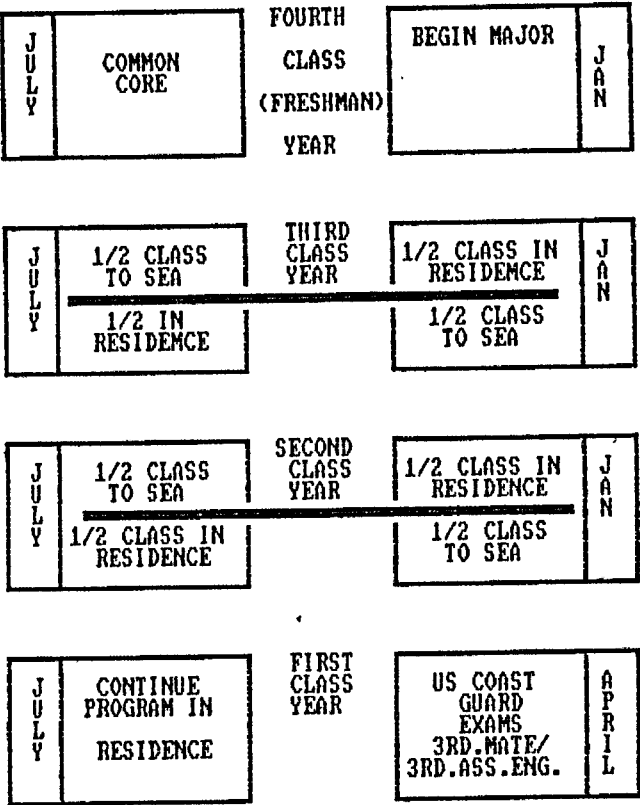


DIAGRAM B.

The National Administration of Shipping and Navigation may also accept service on board ships with a grt of not less than 20. In this case the competency may be restricted as regards both trade area and size of ship.

4.2.6 MET System in the United States of America :

See Diagram)

U.S Merchant Marine Academy "Kings Point"

Course Programs : There are four programs in the U.S Merchant Marine Academy "Kings Point":

1. Maritime Transportation program
2. Ship's Officer Program
3. Marine Engineering Program
4. Dual License Program
5. Marine Engineering Systems Program

For the purpose of this paper, the Dual Licence program is dealt with.

Certificate/Degree Obtained: Bsc. Degree in Maritime Transportation and Marine Engineering

Qualification : Third mate and third assistant engineer licences, and commission to ensign in the US Naval Reserve.

Course Duration : 4 years (including 2 x 6 months sea service)

Minimum Entry Requirements:

- Completion of high school education at an accredited secondary School or equivalent with at least 15 units of credit including 3 units in English, 3 units in mathematics and 1 unit in Physics.

- Passed SAT or ACT test
- Passed physical and health requirements

Course Contents:

Fourth Class Year

Calculus and Analytic Geometry I,II,III,IV
 General Chemistry I,II or Physics I,II
 Engineering Graphics I,II,III
 Marine Safety I
 Introduction to Marine Engineering I,II
 Engineering Shop I,II
 English I,II, III
 Introduction to Computer Usage
 Physical Education: Physical Fitness,
 Swimming and Self Defense, Ship Medicine
 Lifesaving
 Fundamentals of Naval Science
 Safety of Life at Sea I
 Introduction to Electrical Engineering
 Metal Cutting Processes
 Nautical Science IV

Third Class Year

Introduction to Differential Equations
 Physics III, IV
 Metal Joining I
 Introduction to Computer Engineering
 Engineering Mechanics I, II
 Thermodynamics I
 Business/ Maritime Law
 Economics I, II

Naval Weapons Systems

Physical Education: Introduction to Sailing

Second Class Year

Strength of Materials

Principles of Naval Architecture

Fluid Mechanics I, II

Thermodynamics II

Heat Transfer

Electric Circuits I, II

Marine Electronics I

Marine Materials Handling II

Seamanship I

Navigation I

Meteorology

Physical Education: Boxing (Men)

First Class Year

Marine Refrigeration

Alternating Current Machinery

Marine Engineering I, II, III

Internal Combustion Engines I, II

Naval Operations I, II

History I, II

Comparative Cultures

Humanistic Traditions

Managerial Process

Financial Management

Principles of Transportation

Marine Safety II

Communications

Seamanship II

Navigation II
Navigation Lab
Bridge Watchstanding Simulation
Marine Electronics III, IV
Senior Licence Seminar
Physical Education: Tennis, Volleyball

Sea Year

Navigation
Seamanship
Marine Materials Handling
Electronic Navigation
Navigation Rules
Marine Engineering I,II
Machine Shop
Electrical Engineering
Shipboard Systems
Naval Architecture
Refrigeration
Labour/Personnel Relations
Shoreside Internship

4.2.7 MET System in the United Kingdom :

Southampton Institute of Higher Education.

Since September 1989 the Southampton Institute of Higher Education has offered a course for the Higher National Diploma in Maritime Technology, which is designed for the multiple role officer and provides the opportunity to achieve both Master and Chief Engineer qualifications.

The course is designed to ensure that the student is

trained in high technology in order to be fully conversant with the total range of ship systems that will be required as a future ship manager.

Certificate/Degree Obtained: HND Engineering (Maritime Technology)

Qualification : 3rd class Deck Officer and 4th class Engineer

Course Duration :

First Year : 4 months Induction and Balancing course
6 months at sea on a trading vessel with distance learning to gain practical experience about the ship.

After 10 months they are admitted to the Part 1 of HND.

Minimum Entry Requirements: Secondary School 'A' level.

Course Contents:

a. For Conventional Certificate of Competency.

Part I	Value
1. Marine Operations (1)	1
4. Mar.Transport-Structure	0.5
5. Mar.Transport-Stability	1
8. Mar.Transport-Cargo	1.5
10. Nav.Principles/Instruments	2.5
12. Coastal Navigations.	1.5
13. Nav.Ocean & Offshore	1.5
14. Electronic Navigation Systems A	1
15. Electronic Navigation Systems C	2.5
16. Meteorology	1
17. Information Technology	0.5
18. Computing	0.5

19. Computing 0.5

Part II

21. Mar.Ops	1
23. Mar.Transport-Structure	0.5
24. Mar.Transport-Stability	2
26. Mar.Transport-Ship Operation	1.5
27. Nav.Passage Planning	2
28. Nav.Control	0.5
29. Meteorology	1.5
30. Engineering & Control	1
31. Shipping Law	1
32. Management/labour Law	1
33. Commercial Law/Practice	1
34. Project	1

b. For multiple role competency

Term 1

- Bridging Studies
- Engineering Science
- Mathematics
- Navigation

Sea phase training, Distance Learning, Marine Engineering and Ship Operation for 6 months.

Term 2

- HND Part 1 Subjects
- Marine Systems Engineering
- Naval Architecture, Navigation, Meteorology and Marine Operations.

Six Weeks for College-Based Industrial Training

Sea phase for one year :Distance Learning, Marine Engineering, Navigation and Ship Operation

Term 3

- Marine Engineering Systems,
- Electrotechnology
- Electronics
- Navigation Systems
- Naval Architecture
- Marine Operations and Projects
- Department of Transport Bridge and Engineering
- Watchkeeping Certificate

College-Based Industrial Training for 6 Weeks.

On Completion of HND, the student should be awarded the Dept. of Trade Class 3 Watchkeeping Bridge Certificate & Class 4 Engineering Watchkeeping Certificate.

V. FUTURE MARITIME TRAINING AND EDUCATION IN INDONESIA

5.1 DEVELOPMENTS IN WORLD MARITIME TRADE AND SHIPPING INDUSTRIES AND THEIR APPLICATIONS FOR MET .

5.1.1 Developments in the Maritime Trade

General Overview

Until the 1970's the world merchant fleet consisted mainly of three types of carriers for the ocean-going trades. The main types were :

- Cargo liners: multideck carriers equipped with own cargo gear ;
- Dry bulk cargo ships: with single or twin decks with rather limited loading equipment;
- Oil tankers: carriers with an integrated containment construction for the transport of liquid oils.

The introduction of packaged cargo (unit loads) and containers in maritime transport led to a type differentiation within the general cargo liner type. For unit loads the ship design was amended, roll-on/roll-off (Ro-Ro) facilities were installed and special loading gear was adopted .This formed the basis for multi-purpose vessels.

For the mass transport of containers, special container vessels were developed and specific container terminals established worldwide. The latest generation of ships is designed for the carriage of large quantities of containers and for service speeds in excess of 20 knots.

The diversification of transport demands for minerals, chemical liquids, heavy/construction plants, offshore oil

V. FUTURE MARITIME TRAINING AND EDUCATION IN INDONESIA

explorations, high speed ferries and the expansion industry led to the development of specialized type vessels such as chemical tankers, liquified gas carriers, heavy lift vessels, semi-submersibles, drilling ships, car carriers, super ferries, hover crafts, high speed catamarans and much more possibly to come.

The increase in the transport of commodities of a dangerous nature, as well as the increasing traffic density at sea, made international agreements with respect to safety at sea and protective measures for a cleaner environment necessary.

The improvements in diesel engine performance, e.g. the increase in diesel engine output per cylinder and the better fuel economy feasible with diesel power, led to the decline of steam driven carriers.

5.1.2. Developments in the shipping industry.

Table 9). Expansion of the world merchant fleet.

YEAR	STEAM & MOTOR		YEAR	STEAM & MOTOR		YEAR	STEAM & MOTOR	
	NO.	GROSS TONNAGE		NO.	GROSS TONNAGE		NO.	GROSS TONNAGE
1948	29,340	80,291,593	1962	38,661	139,979,813	1976	65,887	371,999,926
1949	30,284	80,578,915	1963	39,571	145,863,463	1977	67,945	393,678,369
1950	30,852	84,583,155	1964	40,859	152,999,621	1978	69,020	406,001,979
1951	31,226	87,245,844	1965	41,865	160,391,504	1979	71,129	413,021,426
1952	31,461	90,180,359	1966	43,014	171,129,833	1980	73,832	419,910,651
1953	31,797	93,351,800	1967	44,375	182,099,644	1981	73,864	420,834,813
1954	32,358	97,421,526	1968	47,444	194,152,378	1982	75,151	424,741,682
1955	32,492	100,568,779	1969	50,276	211,660,893	1983	76,106	422,590,317
1956	33,052	105,200,361	1970	52,444	227,489,864	1984	76,068	418,682,442
1957	33,804	110,246,081	1971	55,041	247,202,634	1985	76,395	416,268,534
1958	35,202	118,033,731	1972	57,391	268,340,145	1986	75,266	404,910,267
1959	36,221	124,935,429	1973	59,606	289,926,686	1987	75,240	403,498,122
1960	36,331	129,769,500	1974	61,194	311,322,626	1988	75,680	403,406,079
1961	37,792	135,915,958	1975	63,974	342,162,363	1989	76,100	410,480,693

V. FUTURE MARITIME TRAINING AND EDUCATION IN INDONESIA

From the table it is apparent that from 1950 the average vessel size increased; in 1975 it stood at double the 1950 figure of 2,742 grt. The average size peaked in 1978 against the level of 1975.

Table 10: Shipbuilding Worldwide.

Area	1950		1960		1970		1980		1986	
	No. ships	Ton-nage ³ *10 ³	No. ships	Ton-nage ³ *10 ³	No. ships	Ton-nage ³ *10 ³	No. ships	Ton-nage ³ *10 ³	No. ships	Ton-nage ³ *10 ³
Europe N	157	558	259	1,289	247	3,001	169	616	111	677
Europe W	573	1,897	757	3,656	569	4,285	295	1,346	219	1,014
Europe S	69	107	160	793	201	1,580	143	792	107	435
Total	799	2,562	1,176	5,738	1,017	8,886	607	2,754	437	2,126
Europe E	-	-	70	220	175	741	114	708	98	737
USA	45	393	49	379	156	375	205	556	36	223
Japan	76	232	653	1,839	1,037	10,100	943	6,094	648	8,178
Rep. of Korea	-	-	-	-	3	2	74	522	128	3,642
Taiwan	-	-	-	-	17	90	26	240	10	383
Brazil	-	-	-	-	10	64	39	729	19	430
R. China	-	-	-	-	-	-	-	-	25	258
Others	33	66	57	227	399	742	404	1,498	233	868
Total	953	3,254	2,005	8,383	2,814	20,980	2,412	13,101	1,634	16,845

Source: Lloyds statistical tables 1950-1986.

The table gives an impression of the shipbuilding activities in the leading shipbuilding regions. Table 10, shows the gradual shift of those activities from Europe to the Far East.

5.1.3 Maritime automation

The term maritime automation is generally used to indicate the use of artificial controllers to replace or to assist manual or mental operations in the operation and management of a ship. 1)

The aim of automation initially was not to replace or reduce crew numbers on board, but was to intentionally control the performance of the engine installation which due to excessive propulsive power demands under varying conditions requires precise control techniques beyond the capabilities of human beings.

Following the 1973 oil crisis, shipowners were forced to cut operating costs and take measures to reduce crew size. However, to stay in business a new concept of ships was considered which would be operated with better returns on investment.

The modern ships of today have been in service with less crew on board than in the past. In the future crew members will tend to be reduced as the application of advanced technology on board, especially automation, will be brought to ships and in many ways will take over the job of the crew.

At present automated ships are operated with a crew of less than 20 persons; for example the Lauritzen Reefers (15000 DWT) have a 7 man crew, and in the future this number will go down further. However, important factors which will set the lowest allowable crew numbers are safety standards and rules and regulations (national and international).

5.1.3.1 Automation Applications.

Automation systems have a monitoring element capable of producing a signal if measured values deviate from pre-set values , and in "on -line- systems" a controller capable of taking corrective action.

In modern control systems micro electronics, micro processors and computers are widely used. Data links between various computer-based automated systems give a new aspect to ship operations and management.

The advanced technologies on board the ships which will bring forth changes in ship operations as the applications of maritime automation, fall into five main areas :

1. Cargo handling and documentation
2. Communication and navigation
3. Shiphandling (maneuvering, stability, structural loads)
4. Ships maintenance
5. Propulsive machinery and power supply

The future types of ships will be highly automated and operate with extended shore assistance with the objective of reducing manpower on board, and at the same time increasing safety and efficiency.

1. Cargo handling and documentation

The type of cargo transported at sea will vary from packaging to the nature of the cargo itself, which may need a specialized carrier such as a chemical carrier, a freezer cargo vessel, a fruit carrier or a RO / RO vessel. Most of the cargo transported by sea will be

unitised cargoes as in containers. Raw materials and mineral bulk cargoes are carried in special bulk carriers such as tankers or dry bulk carriers.

From the point of view of cargo operation, less time will be needed for loading, discharging and documentation. Paper handling will be reduced to a minimum level as efforts are made to facilitate the lengthy documentation procedures and standardization. Computerized methods of cargo handling will be faster than before and operations procedures will be more efficient. With the different types of maritime trade, specially designed ships will be needed. New ports and harbours will also be required to cater to the customers' requirement. All these changes require trained personnel.

2. Communication and Navigation

2.a Communication:

Radio communications on board and ashore will be fully automated and the reliability and availability of the equipment will be satisfactory as technology in communications develops rapidly.

The requirements for the international distress and safety communications systems have been based on fully automated communications systems for ship-internal/ship-external communications. This system will become obligatory in 1992, as the implementation of the GMDSS and control functions will be moved to the bridge.

Satellite communications and other communications on board have reached such a level where radio electronic officers on board are not needed anymore; for example on the

Nedlloyd and Hapag Lloyd ships. Through the INMARSAT system the ships are able to make telephone, telex, or fax contacts with the headquarters from anywhere in the world. Moreover, an on-line data interchange between head office and the ship enables data regarding the ship's position, course, speed and cargo, etc., to be retrieved at any time.

The satellite system provides :

- fast packaged data transfer direct from ship terminals to shorebased installations at any time and practically worldwide;
- a fast and effective liaison between ship/shore staff.²⁾

The communication procedures and operations will be so easy that any authorized person on board can communicate with anybody by telephone just by dialing the number as in any telephone connection. Telex transmitting and receiving are fully automated without requiring a specialized operator. The NAVTEX receiver can receive all the information regarding weather messages, navigational warnings, distress messages and even chart correction through the onboard computer.

Advanced communication technology has become one of the most important means of changing the relationship between the ship's organization and the shore organizations. Also communication systems will provide an improved exchange of, and access to, essential information in both directions.

2.b Navigation:

The art of navigation was the prime responsibility of the navigating officer where position fixing, for instance, was done by visual bearings on coastal voyages and celestial navigation for open ocean passages by using a sextant, chronometer and all the nautical tables. This has changed and will further do so in the future with the advent of radar, ARPA, satellite navigation, electronic charts, automatic voyage planners, etc.

The old navigation techniques are not sufficient anymore.

One of the main reasons for this is the IMO requirement for accuracy of navigation which must be better or equal than 4 nautical miles. This standard of accuracy can hardly be achieved by astronomical navigation.

There are many ships today, old ships, not complying with this requirement of better accuracy of navigation performance. However, the importance of astronomical navigation is still considered significant, in certain countries as one of the skill requirements needed for ship navigation.

At present, automation of the bridge functions covers practically all aspects of navigation, surveillance of the environment and position plotting.

For the safety of navigation, "accuracy" has become an important word in navigational operations. In this sense the development of technology has contributed significantly in improving the accuracy of navigation equipment on board. For example a LOP of LORAN - C has an accuracy of roughly 0.25 nautical mile in the ground wave area, and a GPS accuracy of about 100 mtrs.

The Satellite Navigation system, and other electronic navigation systems, give performances of better accuracy and can update a position at least every 0.2 to 15 minutes. Of course there are limitations to their use in certain areas, for example Geo Stationary (GO) satellite navigation in the lower and higher latitudes (below 10 degrees north/south and above 70 degrees north/south).

The method of position fixing by the use of paper charts will probably change to electronic charts. The advantages are the possibility to be connected to DR position fixing systems and the information obtained from satellite communications. The need to refer to tide tables and lists of lights will no longer exist since this information can be obtained direct from the data base.

Voyages can be planned efficiently in advance. Planned tracks and ground courses are indicated on the display and can be optimized if necessary.

The Dead Reckoning (DR) position accuracy will be improved by better knowledge of ship parameters such as wind drift, current and the integration of speed log , Gyro compass, as the reliability and accuracy of this equipment meets the standard performance requirements.

The impossible and tedious task for the officer of the watch of recording all actions taken on the bridge will be taken over by a data logger (black box), which not only will be useful in casualty investigations but also in economizing ship operations.

.3 Shiphandling (Manoeuvring, Stability, Structural Loads)

.3.a Shiphandling

Another development in the present technology is the shiphandling capability for manoeuvring of vessels entering or leaving harbours, fairways, congested waters, anchoring, mooring etc. Through automation on the bridge, the course or track of the vessel can be kept constant by automatic course keeping, the Radius of Turn can be set and kept constant by the Auto Constant Radius Turn, and the Rate of Turn Indicator (ROT) can also be monitored. Also the movements of ships in longitudinal and transversal directions can all be monitored. By using all these instruments on board, the movement of the ship can be preplanned in advance before executing the real manoeuvres.

Through shore assistance there is the capability of controlling vessels to enter the harbour safely without employing a pilot, by using a VTS where vessel movements will be monitored, by shorebased radar systems and using radio communications to advise the vessel.

In such VTS systems the radar pictures from several strategic locations are processed by a central computer to give an overall picture of traffic. The computer monitors the movement of all moving targets and the operator can have all the information of the vessel shown on the screen. In many ports the authorities use VTS to guide vessels along waterways, which is very useful in restricted visibility. It is also anticipated that the officer of the watch, in the automated bridge, will have no difficulties in directing a ship in restricted areas

with relatively high traffic density, even under poor visibility conditions.

At present anchoring and other winch controls can already be handled remotely with the assistance of closed circuit video cameras. There is also the possibility of standardized mooring equipment, so all the mooring crews will be familiar with the equipment on board. Also there is a possibility to berth the ship alongside by using shore facilities whereby the mooring ropes are given by the shore and taken by the ship's crew and put on the bollards. The automation of berthing, such as existing ferry operations, is also a possibility.

3.b Ship stability and structural loads

Calculations regarding stability, longitudinal strength, damage stability, optimum trim, and on-line to cargo and/or water ballast/ fuel oil tanks can be performed automatically by computer on board without manual calculations and can be fully integrated with network systems for use onboard and in offices.

There are automatic programs for loading calculations which function according to the ship's needs and requirements (e.g for tankers or containerships).

For example, the "Bay Plan" picture shows detailed data for each single container in a selected stack. All results (Dwt, Stowage Factor, Trim, Draft, Heel and Stability) are updated whenever a load is changed.

4 Ship maintenance.

In future ship maintenance, the workload of the crew will be reduced due to the application of advanced technologies

and better maintenance planning . There will be no splicing and knotting or canvas work on board. Working on deck for cleaning or chipping will be out.

The ships of the future will be of lightweight designs, with, for example of, light alloy metals for the construction of blocks, lashing materials, etc. High resistance hull painting and better preparation of hull plating at dry docks. Carrying out maintenance will mainly be done using shore personnel while the ship is in port.

Electronic equipment preventive maintenance and small repairs will be done on board as the reliability and availability of the equipment by redundancies will be extended. For big repairs, during the non-availability period, this will be done ashore.

.5 Propulsive Machinery and Power Supply

Today's technology has made the unmanned engine room possible. In the future much machinery will be standardized and will be the plug-on/off type like in the aircraft industry where entire engines or other parts can be exchanged and replaced or repaired elsewhere, reducing the tasks of the personnel to perform only maintenance for preventive purposes.

The reliability and availability of machinery will be highly increased due to standard requirements. After a certain number of hours of use the equipment is ready for replacement, allowing advanced planning to be possible. However, the most essential units can be left on board as spares for immediate use in case of failure of the units, equipment.

**OPERATION AND MANAGEMENT
OF
FUTURE SHIPS**

ORGANIZATIONAL STRUCTURES

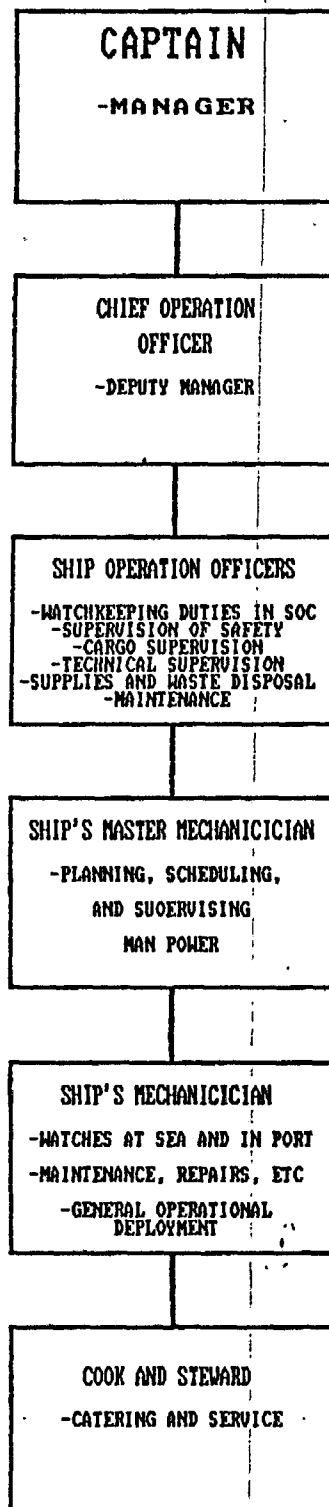


DIAGRAM 11.

Other improvements in engines on board can be mentioned as follows:

- a. Via the conditioning monitoring system on board the machinery performances can be monitored, and this can give an indication about preventive actions to be taken.
- b. Back-up systems, will increase the MTBF=Mean Time Between Failure
- c. Fuel oil treatment will be more efficient and heating systems will be hot water circulation systems and not steam.

By improving machinery performance in the engine rooms to levels of high reliability and integrity, minimum maintenance can be performed on board and only preventive maintenance be necessary.

5.1.4 Future shipboard operation and competency requirements:

Today's advanced technology already has changed the work on board considerably, and this trend will further reduce the number of crew on board. The need to change the traditional organisation on board in order to maintain the same or better efficiency is already evident .

Such an organization could be structured as follows :

... Diagram 11)

- a) The Manager or general supervisor who corresponds to the present captain as the supervisor of ship operations.
- b) The Ship Operation Officers.

The operation of the vessel is an integral part of the tasks of the Ship Operation Centre: watchkeeping duties in SOC, supervision of safety, cargo supervision, technical supervision, supplies and waste disposal, engineering and ship maintenance, radio communication, administration, electronic equipment operation supervision.

c) The Operation and Maintenance Team.

Planning, scheduling and supervising manpower will be done by the Ship's Master Mechanic. The operation and maintenance team will serve under the supervisors (b) and work (e.g maintenance, repairs and general operational deployment), will be done by the Ship's Mechanic during watches at sea and in port.

The formation of the team is to provide flexibility to meet the various tasks and duties aboard the ship.

d) Cook and Steward for Catering and Service. Therefore, realizing the future pattern of shipping where most of the older systems of ship operation will have changed as already mentioned before, there is a need to review the present system of education and training of merchant marine personnel in order to promote the safety and efficiency of shipping in Indonesia.

The competency requirements at present are no longer suitable for future ship operation. For example, the teaching of manual calculations for astronomical position fixing, tidal heights and stability, is to be replaced by computerized procedures.

What will be important for future maritime personnel is to have the capability to supervise the operation and

maintenance of the ship and its equipment and to know about the reliability, availability, and limitations of the equipment.

5.1.5 Outline of main duties of Integrated Officers.

- Voyage planning, taking into account the nature of cargo, safety and economic considerations.
- Evaluation and implementation of voyage reports and related analyses.
- Adjusting the passage planning relative to meteorological influences and navigation restrictions.
- Carrying out navigation in various circumstances.
- Determining the effects of systematic and random errors in navigation.
- Planning and monitoring of equipment repair and communication costs.
- Provision of safe and economic loading procedures with the application of stability and strength data.
- Setting up a stowage plan; doing a survey of dangerous goods loaded; keeping a record of cargo handled on board.
- Application of statutory rules and regulations pertaining to stowage and carriage of cargo in compliance with government enforced safety rules and regulations.
- Safeguarding of cargo during carriage; taking measures principles of damage and damage prevention measures, damage control.
- Assessing the effect on stability of flooding (leakage).
- Overall maintenance, coordination of repair work, spare part procurement and control of the vessel, propulsion and auxiliary systems excluded.
- Maintaining a high standard of cooperation and planning

of shipboard meetings

- Pollution prevention
- Personnel management
- Arranging and attending official surveys and inspections by government officials or classification societies.

5.1.6 The Impact of Automation on Merchant Ships.

Automation and innovation in shipping have characteristically led to smaller complements of seafarers tasked with enlarged technical and managerial responsibilities especially on newly constructed, often highly automated, ships.

The shipboard organization is based on teamwork. The hierarchical structure, with a sharp distinction between various groups of personnel, will disappear.

Automation makes work less timeconsuming, improves economical operations and leads to fewer people on board. This is the one, and probably the only, option in overcoming the shortages in the future. Automation on board also creates and facilitates the integration of crew on board and may be able to do so for various tasks and duties.

The developing countries at present might be in stiff opposition to the concept of reduced crews. It has to be realized, however, that the technically advanced ships, which are now in operation, will be available on the secondhand market in the near future and that new ships of that kind will be widely available in the next decade to so-called developing countries.

Therefore ,if Indonesia in the future intends to compete

effectively in shipping and manning, it must be ready to prepare and adopt changes in maritime education and training .

5.1.7 The seafarers of the future:

The future requirement for seafarers is to have highly qualified officers and other crew to carry out operations in an intelligent way with a broad knowledge of all aspects of the engine and deck.

Today's operation on board is becoming more and more technical and the deck officers require more technical knowledge. On the other hand, engine operations are becoming more supervisory in nature and need not require a very high level of technical knowledge.

By integrating ship operations, there will be enough personnel who are trained sufficiently to cope with almost any situation expected on board. The availability of officers is improving. This benefits the crew and shipowner.

The application of high technology may be feared, by the developing countries, due to the fact that countries having excess manpower like Indonesia, will have to reduce manpower. But this does not necessarily mean reduced personnel in a particular organisation as a whole. It may be possible to shift manpower from one department to another or from high-cost shipboard operations to low cost operations ashore.

Therefore, for Indonesia, in order to survive in the very tough competitive shipping business and by utilizing our

huge potential human resources, to have a share of supplying the manning of ships in the market, there must be training institutes to train and educate young, bright students to the standards required by the ships in the future, which will be mostly automated and have integrated systems on board.

Many developed countries have already implemented integrated training schemes, notably the Netherlands, France, the USA, the United Kingdom and Germany, for integrated officers on board. There are some countries which are skeptical about this integration system but those who have already implemented it think it is well worth investing in. And it is only a matter of time, sooner rather than later, that integrated ships and their operators will be required.

5.1.8 Toward the integrated training of deck and marine engineer officers.

From the point of view of safety at sea, all ships shall be sufficiently and efficiently manned. Shipbuilders and marine equipment designers now offer to shipowners a range of products which will allow them to achieve savings in manpower, greater efficiency, lower costs and higher profits. MET will have to provide capable and fully qualified crews.

Most shipowners, when the time comes to invest, will want to buy ships incorporating " state of the art " technology. They will want to take advantage of any increased earning potential and cost saving, but will be cautious and not want to be too ambitious with " risky " unproven products.

As employers, the shipowners will regard the perfect crew as that which will be able to produce the best profit.

The "perfect crew" means smaller crews which can do as much as possible in order to have good efficiency on board.

However, the problem arises as to which function to assign to whom and what policies will define the number, skills and competencies which will be required in the future. It is always difficult for shipowners to develop imaginative and future personnel strategies.

Therefore MET should foresee the objectives of future professional functions and competencies.

The advent of new technology is changing all shipboard functions and is changing or emphasizing others. The need for cross-discipline training will become more and more important. Dual-certification would allow duties to be more evenly distributed.

Changes in maritime training and education are subjects which are also relevant to future ship operations such as condition monitoring, global positioning systems, communications, electronics, preventive maintenance, etc.

5.1.9 Advantages of integrated maritime education and training.

The dual certification schemes of today are nothing other than temporary means to fill the gap which is caused by manning modern ships with an old fashioned certification system. In the future the emphasis for qualified engine operators and maintainers will disappear because of

increased reliability and availability of equipment and a high level of automation. What will be needed in the future is a crew being fully qualified to supervise the operation of a ship and with enough comprehension of shipboard technology, shipping company interests and environmental requirements to decide on the actions to be taken.

Some of the experts believe that the breadth of training and experience involved in dual-certification schemes give the trainee much better career prospects within the maritime industry than the older training systems.

The improved education and training will be of advantage for those seafarers who, after a seagoing career, want to start a new career ashore since it offers them a better possibility of employment in other branches of the industry where system engineering is applied or where managerial qualities are required. With their additional capabilities they fit better into port transport organizations. Having a maritime background they have the added advantage that they are better aware of a shipmaster's needs and this might in turn improve port operational efficiency.

The integrated training of ship officers provides flexibility to a higher degree than ever before. The increased use of automated processes means the operational work loads aboard ship are changing and will continue to change with technological advances. One major effect is the convergence of the functions of the deck and engine departments as increasing use of control systems for engine, cargo and navigation operations diffuse the differences between deck and engine functions at all operational levels. The concept of integrated trained

officer involves this convergence of functions so that each can therefore better understand the operational problems of the other.

The advantage of the integrated officers, if they are trained in that system, is that they fit better into any given organizational structure, and that they are available for both technical maintenance and repair as well as for cargo handling tasks next to watchstanding duties and thus they satisfy the need for role flexibility.

Whatever the operational requirements of high technology ships of the future, an integrated officer will be better equipped to adapt to the changing work loads and to manage the very expensive industrial plant units.

For the youths who are still at the exploratory stage of career choice, the integrated training scheme leaves their options open, even to the extent of changing careers, where their dual qualification would be of use in shorebased management.

An integrated officer can be efficiently employed either as Deck Officer or Engineer. The ability to supervise deck and engine departments, for the captain is very useful since he has the authority, knowledge and ability and being the only appointed person responsible towards the shipowner.

The possibility of finding a new job ashore, if he decides to leave the sea, is much easier. The integrated officer who understands the problems of both aspects builds up his confidence.

For the owner, there is the possibility to embark one officer immediately as deck officer or engineer. There is also the possibility to be employed partly as deck officer and partly as engineer on the same ship. In short there is always flexibility of functions on board the ship .

5.2 PROPOSAL FOR THE FUTURE MARITIME EDUCATION AND TRAINING IN INDONESIA

5.2.1 Step by step towards the future MET systems

The idea of an integrated maritime education and training system is based on changes in the operation of modern ships. The subsequent changes in crew size, crew composition and distribution of tasks and the existing qualifications based on conventional requirements no longer fit the functional requirements on board modern ships.

The advanced systems and devices on board ships require that the crew, in order to safely and efficiently operate the system, have to understand the operation principles of those systems and devices.

The advantage of the integrated officer is that he fits better into a modern organizational structure, and is available for both technical maintenance and repair as well as for ships handling tasks and navigation duties. He thus satisfies the need for role flexibility.

There is less and less distinction between the engine and deck departments, since engines can be remotely attended to, operated or monitored from the bridge. Therefore, it is necessary to design new qualification standards to fit

the future functional requirements recognized.

It should be very clear that the change in training and education cannot be accomplished overnight, nor would it be wise to try to do so. There are many obstacles to overcome. As a consequence of the automation and integrated operation of ships it seems apparent that educational attention should be given, in the initial maritime education, to modern technological systems applications and therefore to maritime studies in:

- system engineering;
- control techniques;
- electric and electronic systems;
- information and computer techniques;
- communication systems;
- management, organization and planning, decision making and communication techniques for further application and higher rank courses; these should be extended or incorporated in basic maritime study programs. 3)

.1 Review and update curriculum and syllabus

Firstly it will be necessary to scrutinize the existing study programs for matters that have become obsolete. New subjects have to be inserted and the total study programme has to be divided into rounded-off subject modules. This can be done by setting up a special committee comprising people relevant to the tasks: the maritime administration, training institution, the union.

To set the time span of integrated training, the following approach should be considered:

- .a Outline the subjects and objectives first and then allocate the necessary time.

- .b Remove all obsolete subjects :ropes and knots, steam engine.
 - .c Reduce practical seamanship, ship equipment and rigging.
 - .d Apply efficient teaching methods, concept training, project training and modular approach, using more efficient teaching equipment such as simulators, slides, videos and computer-aided learning and instruction.
 - .e Narrow down the scope of a subject area by eliminating all kinds of minor elements and focusing on the necessary items to be taught.
 - .f Cut out all repeated treatment of items: by means of an accurate subject matter description from the teachers involved; matching of these should show wherever overlaps occur.
 - .g Add new and future subjects gradually.
 - .h Obtain qualified lecturers/instructors relevant to MET.
- .2 The improvement and development of teaching staff and training aids.

To improve skills and operational efficiency procedures, trainers and simulators will be needed. The improvement of teaching staff can be done in the following way:

- encourage staff to do research into their subjects, leading to mastery of subject and developing paper writing and analytical skills, presentation communication skills.
- encourage staff to attend seminars, conferences, workshops, and up-grading courses relevant to the MET interests.
- organise in-house training courses to meet specific

needs.

- arrange training interactions with other institutions.
- set up a subject development committee.
- keep up to date with current developments especially in subject area.

One way of improving the training aids is to have simulator training, but large investments are necessary to acquire such training aids. Therefore, before such a thing is obtained, a careful appraisal assessment must be made to see that the learning objective can be met by the simulators according to the expectations.

As previously mentioned for efficient training and learning, the simulator as a teaching and training device is essential. Proper simulator training can help correct the problems of inexperience, stress and human errors.

The advantages of simulator training are:

- a. The simulator can create dangerous situations which do not actually exist
- b. The repetition of the same situation.
- c. The creation of any place and any condition in a training environment.
- d. The changing of parameters similar to the conditions required.
- e. The training of students economically and in a short time.
- f. The study of human performance under stress.

The marine simulators which are now available on the market are:

- a. Radar Arpa Simulators
- b. Shiphandling Simulator
- c. Liquid and Cargo Handling Simulator
- d. Tanker Operation Simulator
- e. Engine Plant Simulator
- f. Satellite Communication Simulator.

Another way to promote and enhance the objective learning process is to have cooperation among maritime education and training institutions in the region so that there is the possibility of exchanging information, sharing facilities and resources, arranging student exchanges, trainer exchanges etc.

.3 Review and amendments of rules/regulations/syllabus.

As a consequence of the changes in the maritime educational and training systems, it may be necessary to review the present rules and regulations, which are already outdated, and change the organizational structures of the national institutes that provide the education and training at present.

.4 Integration of maritime education and training.

The aim of total integration of maritime education and training is to produce qualified maritime operators who can run a ship safely and efficiently.

Improved education and training will be advantageous to those seafarers who, after a seagoing career, want to continue their career ashore. With their allround capabilities they fit well into shore transport

organizations and shipping companies, which has the added advantage that they are better aware of ship operations and this will in turn improve shore-based operational efficiency.

5.2.2 COURSE CURRICULUM FOR INTEGRATED OFFICERS:

PERIOD : 4 ACADEMIC YEARS, comprises of:

First Year : 40 Weeks

Second Year : 40 Weeks

Third Year : On board ship (Sea Project)

Fourth Year : 30 Weeks

The first two years constitute basic studies and at the end of the second year, it is expected, such knowledge and skills have been acquired that adequate sea practice can be done.

The third year is the Sea Project in which the student gains experience in all aspects of operations on board ship.

The aims of the Sea Project are:

- to gain experience in ship's operation.
- to compare theoretical knowledge with the practice on board the ship.
- to support and supplement the theoretical knowledge with the practice aboard ship,
- to be well prepared for the final study year.

The Sea Project on board a ship must be assigned and evenly distributed among bridge and engineroom activities,

reserving a balanced time for each discipline.

The fourth year is the final or graduation year.

5.2.3 CURRICULUM .

5.2.3.1 Subjects:

a.Basic Subjects:

Ideology Pancasila P4
Indonesian Language
National History
Humanitarian
Basic Cultural Studies

b.Basic Supporting Subjects:

Mathematics
Physics
Health and First Aid
English
Maritime Law/ Law of the Sea
Shipping Law
Maritime Trade and Economics

c.Vocational Subjects:

Electronics
Automation
Meteorology and Oceanography
Mechanics and Hydromechanics

d.Navigation Shiphandling and Communication:

Bridge Operation and Procedures
 Electronic Navigation System
 DR Systems
 Communications
 Ship Manoeuvring and Handling
 Ship Construction, Stability and Damage Control
 Cargo Handling
 Fire Prevention and Fire Fighting
 Emergency Procedures
 Voyage and Passage Planning
 Search and Rescue.
 Personnel Management, Organization and Training

e. Marine Technology

Ship Power Plant
 Engineering Lab and Practice
 Propulsion Systems
 Auxiliary Systems
 Operational Principles of Diesel Installations
 Operation and Maintenance of Machinery

5.2.3.3 Timetable:

Subjects:	Year 1		Year 2	
	Sem.1	Sem.2	Sem.3	Sem.4
Basic Subjects:				
Ideology Pancasila P4	2	-	-	-
Indonesian Language	2	-	-	-
National History	2	-	-	-

Subjects:	Year 1		Year 2	
	Sem.1	Sem.2	Sem.3	Sem.4
Humanitarian	1	-	-	-
Basic Cultural Studies	1	-	-	-
Basic Supporting Subject				
Mathematics	3	3	1	1
Physics, Mechanics and Hydromechanics	3	3	1	1
Health and First Aid	-	-	2	2
English	-	-	2	2
Maritime Law/ Law of the Sea	1	1	1	1
Shipping Law	1	1	1	1
Maritime Trade and Economics	2	2	1	1
Data Processing	1	1	1	1
Vocational Subjects:				
Electronics	2	2	4	4
Automation technics	3	3	3	3
Naval Architecture	-	-	1	1
Communications	-	-	2	2
Navigation and Seamanship	2	8	5	5
Bridge Operation and Procedures(Passage Planning) Electronic Navigational				

Subjects:	Year 1		Year 2	
	Sem.1	Sem.2	Sem.3	Sem.4
System				
Meteorology and Oceanography				
Compasses and Speed Logs				
Ship Manoeuvring and Handling				
Ship's Construction Stability				
and Damage Control				
Cargo Handling and Stowage				
Personnel Management,				
Organization and Training	2	-	-	-
Marine Technology	4	4	5	5
Ship Power Plant				
Engineering Lab				
and Practice				
Propulsion Systems				
Auxiliary Systems				
Thermodynamics				
Operational Principles of				
Diesel Installations				
Operation and Maintenance				
of Machinery				
-Total : Hours/Week	30	30	30	30

Fire Prevention and
Fire Fighting
Emergency Procedures

To be held as a special
courses IAW STCW 1978.

Medical Care

Life Saving, Search and Rescue.

4th Year

Tentamination/Examination:

<u>Subjects</u>	<u>Year 4</u>	
	<u>Sem.7</u>	<u>Sem.8</u>

Part I

1. Health	1	1
2. Automation	2	2
3. Naval Architecture	1	1
4. Manoeuvring	1	1
5. Meteorology and Oceanography	1	1
6. Practice Lab Machine and Electric Plants	2	2

Part II

7. Navigation, Instruments		
8. Voyage and Passage Planning and Execution		
9. Cargohandling, technology		
10 Collision Rules	10	10
11 Propulsion Plants		
12 Auxiliary Systems	4	4
13 Electric Plants		

Part III

14 Project	3	3
15 Obligatory Supplement	3	3

Radar Observer

To be held IAW STCW-1978

Shiphandling Simulator

Convention (2 Weeks)

All specific courses laid down in the STCW-1978 convention, incorporating the above subjects.

Total : 30 Hours/Week for 2 Sems.

5.2.4 LEARNING OBJECTIVES :

Navigation, Shiphandling and Communications:

General learning objectives:

- To be able to navigate the ship from one point to another in a safe and efficient manner.

Specific learning objectives:

- To understand and be able to maintain standards of watchkeeping on the bridge conforming with rule II/1 of the STCW convention.
- To be able to perform position fixing by means of visual observations.
- To have the ability to perform DR navigation.
- To have the ability to determine the ship's position with the aid of electronic position fixing systems.
- To understand the use of radio bearings.
- To have the ability to use charts and nautical publications such as sailing directions, tide tables, lists of lights, lists of radio beacons, NTM and navigational warnings.
- To have the ability to assess the accuracy of navigation.
- To have the ability to use maritime communication

systems.

- To have the ability to use echosounders and logs, including electric and electronic systems.
- To have the ability to use radar for the prevention of collisions (radar observer certificate) including ARPA.
- To apply the rules for the prevention of collisions at sea (Rules of the Road).
- To keep a look out, including recognition and interpretation of lights and sound signals.
- To have the ability to give orders in Indonesian and English, to have knowledge of the operation of current steering systems, including automated ones.
- To have the ability in shiphandling for manoeuvring, taking into account effects of cargo, draught, trim, speed, underkeel clearance, shallow water, wind, current, alterations of course and turning circles, as well as variations of speed and stopping distances.
- To supervise on deck during anchoring, fore and aft when berthing and unberthing ("making stations").
- To perform the anchoring procedure: use of ground tackle, heaving winches, stopping off procedures, fastening heaving lines and messengers with requisite knots and hitches.
- To apply meteorological, navigational and ship data in making a voyage or passage planning.
- To process up-to-date information concerning safe navigation, including correcting charts and nautical publications.
- To be able to understand and use navigational information and warnings, meteorological information, ship to ship and ship to shore communication by using the "IMO Standard Marine Vocabulary"

Ships Safety, Pollution Prevention and Assistance

- Determining static stability, application of hydrostatic curves and interpretation of stability curves.
- Understanding the use of means (devices) to determine stability (loadmaster)
- Attending and supervising fire and boat drills.
- Preparing, using and maintaining safety equipment.
- Performing as commanding officer in lifeboats and rafts.
- Using and maintaining firefighting equipment and fire and explosion preventing and detecting systems; taking command of firefighting operations.
- Participating in actual firefighting, including use of breathing apparatus.
- Using and taking care of systems and arrangements for watertight subdivision and closing, as well as bilge and ballast systems.
- Using strength data and devices on board, if any, to determine stresses in a ship's structure to avoid excessive stress caused by faulty loading or by excessive waves.
- Reading and interpreting the safety plan; using escape routes.
- Using devices to transmit distress signals, both by visual means and by radio telephony.
- Applying the Code for Survival at Sea.
- Applying the Code of Safe Working Practices for the Safety of Merchant Seamen, Officers, Engineers.
- Carrying out statutory rules for Pollution Prevention, including keeping records of fuel oil and lubricating oil drain-off.
- Using bilgewater separator and gauges to determine oil content of drainage water.
- Keeping the oil log.
- Rendering first aid in case of accidents or diseases.

- Being able to use of means of communication.
- Carrying out tank-entry and gasfreeing procedures for inspection, maintenance and repair.
- Handling computers and data processors.

Communication

- Have the ability to operate the bridge transmitting and receiving equipment for purposes of communication in compliance with current international procedures.
- Understand the application of current international rules for distance communication, including distress, urgency and safety signals; also common radio communication by means of the International Signal Code.
- Be able to use VHF telephony for communication for the sake of safe navigation.
- Keep a written account of communications held for the navigation concern.

Cargo handling

- Supervise safe loading and discharging procedures, including handling dangerous goods and liquid cargoes, proper safe operation of cargohandling equipment and pumping systems for liquid lines.
- Secure cargoes.
- Supervise preparation for loading; supervision of cleaning holds and cargotanks, including gasfreeing. Proper assessment of quality and application of cleaning materials/ means.
- Apply prevailing safety regulations, particularly those pertaining to carriage of dangerous goods. (IMO Dangerous Goods Code, Manual for the carriage of dangerous goods)
- Use of displacement scale; calculating trim and draft, including the effect of water density.

Marine Technology

General Objectives-Learning :

To operate, monitor, supervise and maintain the ships main propulsion and auxiliary engines in a safe and efficient way.

Specific Objectives-Learning :

- Be able to prepare, for starting and stopping, main propulsion plant (engines) and auxiliaries .
- Maintain and control of steamboilers and fire plants for auxiliary systems .
- Apply lubricants and lubricating systems.
- Be able to take precautionary measures against risk of fire and explosion.
- Take regular care and perform maintenance of auxiliary engine.
- Take regular care and perform maintenance of combustion engines.
- Check and regulate auxiliaries of main propulsion plant.
- Take regular care of and maintain main shafting, propeller shafts and main shaft sealing.
- Be able to perform manoeuvring operations with main engine, bridge and remote control including emergency procedures.
- Register essential process data.
- Use proper insulating and packing materials and means.
- Be able to read and interpret blueprints, diagrams, flow charts and trouble shooters.
- Be able to operate and maintain the supporting and domestic systems with auxiliary equipment for :

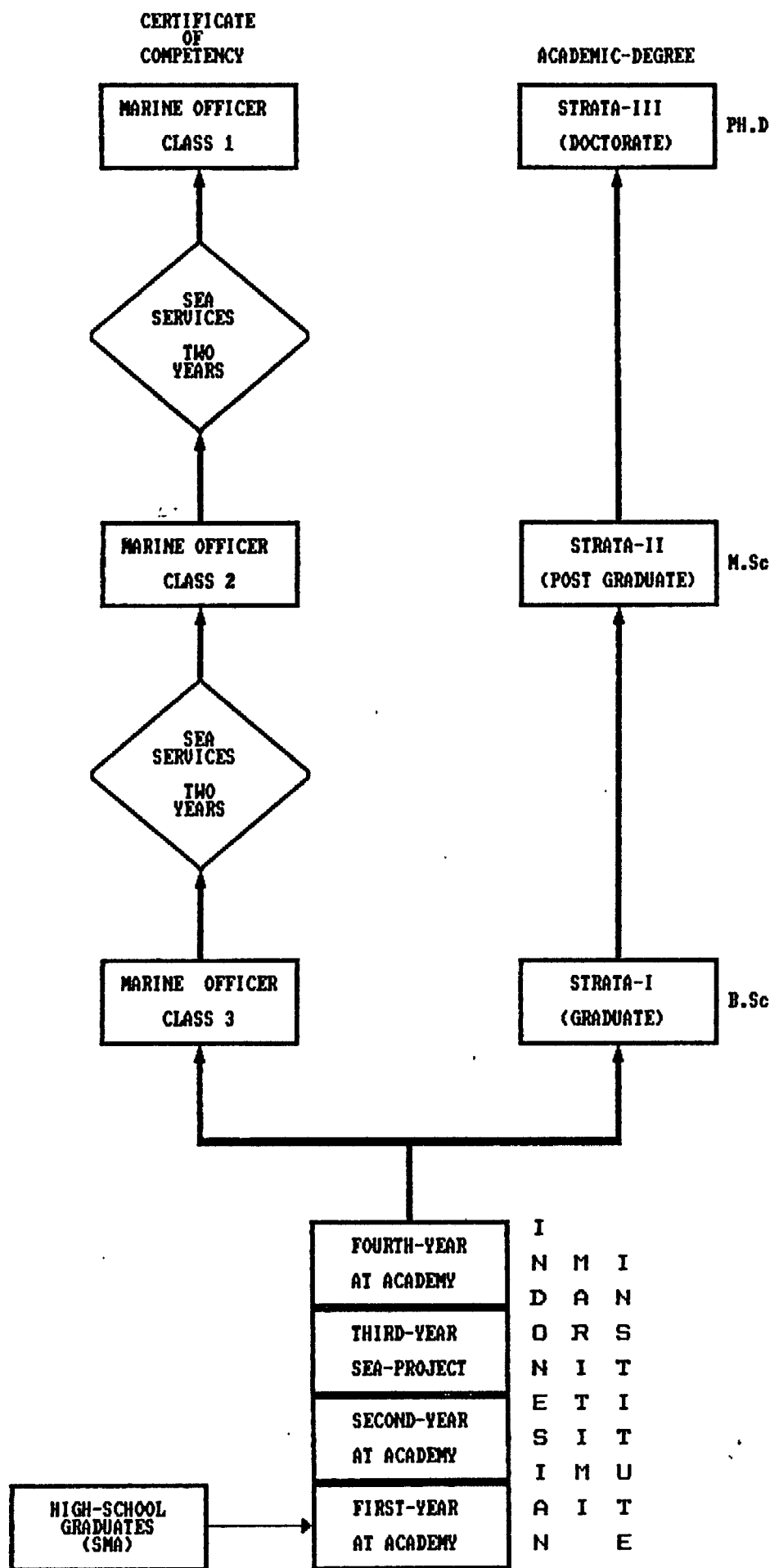
- . air conditioning of cargo spaces
 - . cargo heating in tanks
 - . cooling and/or refrigerating cargo and victuals
 - . air conditioning of living and working spaces
 - . purification of fuel and lubricating oil
 - . generating steam for power and heating purposes
 - . generating electrical power
 - . raising power for hydraulically and pneumatically operated gear
 - . bunkering (rendering assistance).
- Carry out simple workshop activities, including drilling, tapping, soldering, turning, welding, burning, also handling common modern tools and aids for the purpose of maintenance and repair, such as testing and gauging equipment.
 - Be able to maintain and make repairs of propulsion and auxiliary equipment and remedy failures of the electrical and electronic equipment.
 - Participate in maintenance control administration and work planning
 - Apply proper anti-fouling and anti-corrosion materials and means.
 - Apply cleaning equipment and materials for ship, equipment and tanks.

5.2.5 CERTIFICATION:

Upon successful completion of the Course the student will be awarded :

1. Marine Officer Class 3, and
2. Strata I Diploma. (Equal to S1 University Level)

For the higher level Certificates, the candidate must satisfactorily complete 2 years sea service overseas or



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hometrade plus attend a compulsory refresher course and the certificate issued must be in accordance with the function which has been performed.

For a post graduate degree the holder of Strata I may proceed to that level (S2) by continuing education and research and may go up to the doctorate degree (S3).

For the Highest Level Certificate, the above requirement is also applied. See Diagram 12)

Reference Chapter V :

- 1) "Impact of Shipboard Automation on Manpower Development and Training Requirements" p. 17, Economic and Social Commission for Asia and The Pacific, Bangkok-Thailand, September 1989.
- 2) Ibid. p. 20.
- 3) Ibid. p. 42.

VI. CONCLUSION AND RECOMENDATIONS

VI CONCLUSION AND RECOMMENDATIONS.

Finally, to conclude this paper the author would like to emphasize fact that the "facilitating of training and education for seafarers is a manifestation of human investment for the benefit of future generations of the country and also an implementation of a message in the preamble of national constitution (UUD 1945)".

Therefore it is recommended to decision makers that they give more attention to the maritime industry as a whole and shipping activities in particular as a source of employment.

Maritime trade and shipping activities in Indonesia are prosperous and continually undergoing further development.

The world demand for seafarers is projected in huge numbers for the year 2000. Therefore, it is necessary for the country to set up all the necessary means to develop its extensive human resources in supplying seafarers to meet the world's needs. The opportunities and prospects of seafaring careers are wide open, advantageous for individuals, and potentially beneficial for the economy and security of the nation.

A seafaring career is recommended for the young as one of the best alternatives to gain a reasonable living standard.

The objectives of maritime education and training in Indonesia are mainly concerned with facilitating the utilization of the national fleet. There is a need to develop maritime education and training systems that meet the national and international standards and

VI. CONCLUSION AND RECOMENDATIONS

requirements for utilization in the international market.

The current state of maritime education and training in Indonesia is still the conventional type of monovalent systems. Today most developed maritime education and training countries are using integrated training systems. Therefore, in the future there will be a need to change the present system in order to meet the future requirements.

The increase in automation on board ships has led to the integration of jobs at sea, with less people in manning. So the requirement will be for people who can operate the systems safely and efficiently and understand the limitations of the instruments which enable them to perform various tasks in a short time.

The future maritime education and training should lead to the integration of training systems, as jobs at sea will require such personnel. Therefore the course curriculum must be set up in such a way as to meet the skill requirements.

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